

11

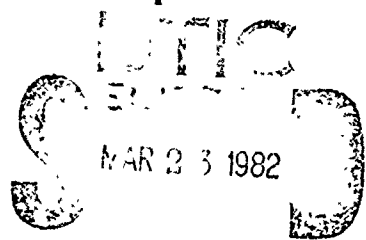
AD A 112457

The FY 1983 Department of Defense Program for Research, Development, and Acquisition

Statement by the Honorable
Richard D. DeLauer
Under Secretary of Defense,
Research and Engineering,
to the 97th Congress
Second Session, 1982

DTIC FILE COPY

Department of Defense



A 82 03 23 079

This document has been approved
for public release and sale; its
distribution is unlimited.

**The FY 1983
Department of Defense
Program for Research,
Development, and
Acquisition**

Statement by the Honorable
Richard D. DeLauer
Under Secretary of Defense
Research and Engineering
to the 97th Congress
Second Session, 1982

Hold for Release
Until 10:00 A.M. (EST)
Tuesday, March 2, 1982



Accession For	
FRIS GFA&I	<input checked="" type="checkbox"/>
DTIC TAB	<input type="checkbox"/>
Unannounced	<input type="checkbox"/>
<i>Little in file</i>	
Distribution/	
Availability Codes	
for	
A	

THE FY 1983 DEPARTMENT OF DEFENSE PROGRAM FOR
RESEARCH, DEVELOPMENT AND ACQUISITION

Table of Contents

	<u>Page No.</u>
TABLE OF CONTENTS-----	i
LIST OF FIGURES-----	vii
LIST OF TABLES-----	viii
I. INTRODUCTION TO THE FY 1983 RD&A BUDGET AND PROGRAMS-----	I-1
A. USDRE RESPONSIBILITIES-----	I-3
B. APPROACHES TO RD&A IMPROVEMENTS-----	I-5
1. Reorganization of OUSDRE-----	I-5
2. Long-Range Resource Planning-----	I-7
3. Improvements in the Acquisition Process-----	I-7
4. Strengthen the Industrial Base-----	I-9
5. Deploying our Technology More Effectively-----	I-10
C. THE MILITARY INVESTMENT BALANCE-----	I-10
D. MAJOR RD&A THRUSTS-----	I-14
1. Strategic and Theater Nuclear Forces-----	I-15
2. Chemical Warfare-----	I-16
3. Tactical Warfare-----	I-16
4. C ³ I-----	I-17
5. Science and Technology-----	I-17
6. Cooperation with the Congress-----	I-18
II. NET BALANCE--MILITARY EQUIPMENT AND TECHNOLOGY-----	II-1
A. INTRODUCTION-----	II-1
B. WEAPONS R&D AND PROCUREMENT PROCESS-----	II-1
C. THE BALANCE OF MILITARY EQUIPMENT AND INVESTMENT-----	II-3
1. Weapons Produced Annually-----	II-4
2. Weapons Introduced Annually-----	II-6
3. Strategic Forces-----	II-6
4. General Purpose Forces-----	II-12

TABLE OF CONTENTS CONTINUED

Page No.

D.	SIGNIFICANT MILITARY TECHNOLOGY DEVELOPMENTS-----	II-20
III.	ACQUISITION STRATEGY-----	III-1
A.	INTRODUCTION-----	III-1
B.	STABILITY AND COST REDUCTION-----	III-3
	1. Full Funding-----	III-3
	2. Multi-year Contracting-----	III-4
	3. Improved Planning-----	III-5
	4. Lowering Administrative Costs-----	III-6
	5. Increasing Productivity-----	III-6
	6. Realistic Budgeting-----	III-7
	7. Increasing Competition-----	III-8
	8. Acquisition and Distribution of Commercial Products (ADCoP)-----	III-9
	9. Use of Common Equipment Across Systems-----	III-9
	10. Embedded Computer Support-----	III-9
C.	REDUCING ACQUISITION TIME-----	III-10
	1. Preplanned Product Improvement-----	III-10
	2. Front-End Funding-----	III-11
	3. Funding Flexibility-----	III-11
D.	IMPROVING SUPPORT AND READINESS-----	III-11
	1. Contractor Incentives-----	III-12
	2. Standard Operating and Support Systems-----	III-12
	3. Manpower, Personnel, and Training Impact on Design-----	III-12
	4. Readiness Goals-----	III-13
	5. Front End Funding for Test Hardware-----	III-13
	6. Weapon Support Funding-----	III-13
E.	IMPROVING THE DSARC PROCESS-----	III-13
	1. Raising the Threshold for Major System Definition-----	III-14
	2. Reduction of DSARC Milestones-----	III-14
	3. Integrating the DSARC and the Budget Process-----	III-15
F.	SUMMARY-----	III-15

TABLE OF CONTENTS CONTINUED

Page No.

IV. INDUSTRIAL RESPONSIVENESS-----	IV-1
A. INTRODUCTION-----	IV-1
B. PROGRAM DESCRIPTION AND STATUS-----	IV-2
1. The Defense Production Act-----	IV-4
2. National Defense Stockpile-----	IV-4
3. Manufacturing Technology Program-----	IV-5
4. Industrial Base Technology Modernization-----	IV-6
5. Industrial Base Guidance and Funding-----	IV-6
6. Government/Industry Relations-----	IV-7
C. CONCLUSIONS-----	IV-8
V. INTERNATIONAL ACTIVITIES-----	V-1
A. INTRODUCTION-----	V-1
B. DIRECTIONS AND METHODS OF INTERNATIONAL ARMS COOPERATION-----	V-1
1. NATO/Europe-----	V-2
2. Middle East/Far East/Southern Hemisphere-----	V-3
3. International Defense Agreements and Trade Policy-----	V-5
C. TECHNOLOGY TRANSFER-----	V-7
D. FOREIGN WEAPONS EVALUATION-----	V-10
VI. SCIENCE AND TECHNOLOGY-----	VI-1
A. INTRODUCTION-----	VI-1
B. MANAGEMENT ACTIONS-----	VI-2
C. THE TECHNICAL PROGRAM-----	VI-3
D. UNIVERSITIES AND LABORATORIES-----	VI-5
E. CONCLUSIONS-----	VI-8
VII. STRATEGIC AND THEATER NUCLEAR FORCES-----	VII-1
A. STRATEGIC WARFARE AND C ³ I-----	VII-1
1. Mission Area Definition-----	VII-1
2. Current Status-----	VII-2
3. Strategic Force Programs-----	VII-4

TABLE OF CONTENTS CONTINUED		Page No.
B.	THEATER NUCLEAR WARFARE AND C ³ I-----	VII-10
1.	Mission Area Definition-----	VII-10
2.	Current Status-----	VII-11
3.	Theater Nuclear Force Programs-----	VII-12
VIII.	TACTICAL WARFARE-----	VIII-1
A.	TACTICAL WARFARE PROGRAMS OVERVIEW-----	VIII-1
1.	Broad Goals and Objectives-----	VIII-1
2.	Mission Area Definitions-----	VIII-1
B.	NAVAL WARFARE-----	VIII-3
C.	LAND WARFARE-----	VIII-6
D.	AIR WARFARE-----	VIII-7
E.	MOBILITY AND SPECIAL PROJECTS-----	VIII-9
F.	ACQUISITION STRATEGY-----	VIII-12
1.	Long Range Resource Planning-----	VIII-13
2.	Decrease Cost Growth-----	VIII-13
3.	Shorten Acquisition Cycle-----	VIII-15
4.	Speed Technology Transition-----	VIII-16
5.	Military Operational Readiness-----	VIII-16
6.	Industrial Readiness-----	VIII-16
IX.	CHEMICAL WARFARE-----	IX-1
A.	INTRODUCTION-----	IX-1
B.	RESEARCH AND DEVELOPMENT PROGRAMS-----	IX-2
1.	Defensive Programs-----	IX-3
2.	Retaliatory Programs-----	IX-4
3.	Supporting Programs-----	IX-5
4.	Acquisition Status-----	IX-5
C.	CONCLUSIONS-----	IX-6
X.	COMMAND, CONTROL, COMMUNICATIONS AND INTELLIGENCE (C ³ I)-----	X-1
A.	INTRODUCTION-----	X-1

TABLE OF CONTENTS CONTINUED

Page No.

B.	C ³ I CHARACTERISTICS AND REQUIRED ATTRIBUTES-----	X-2
C.	C ³ I INITIATIVES-----	X-3
1.	C ³ I-Weapons System Management-----	X-3
2.	The Evolving C ³ I System Acquisition Strategy-----	X-3
3.	C ³ I System Resistance to Enemy Actions-----	X-4
4.	Interoperability-----	X-5
D.	SIGNIFICANT ACCOMPLISHMENTS-----	X-6
1.	Total C ³ I-Weapons System-----	X-6
2.	The Evolving C ³ I System Acquisition Strategy-----	X-8
3.	C ³ I System Resistance to Enemy Actions-----	X-9
4.	Interoperability-----	X-10
E.	SUMMARY-----	X-11
XI.	DEFENSE-WIDE MISSION SUPPORT-----	XI-1
A.	TEST AND EVALUATION-----	XI-1
1.	Objectives-----	XI-1
2.	Major Systems-----	XI-1
3.	Joint Operational Test and Evaluation (JOT&E) Programs-----	XI-2
4.	Test Facilities and Resource Accomplishments-----	XI-2
5.	Foreign Weapons Evaluation (FWE) Program-----	XI-3
B.	SPACE AND ORBITAL SUPPORT-----	XI-3
1.	Space Shuttle-----	XI-3
2.	Consolidated Space Operations Center (CSOC)-----	XI-5
C.	NUCLEAR WEAPONS ACQUISITION SUPPORT-----	XI-5
D.	GLOBAL MILITARY ENVIRONMENTAL SUPPORT-----	XI-7
E.	TRAINING SUPPORT-----	XI-8
APPENDIX-A		
	Funding Summaries-----	A-1
	RDT&E by Component-----	A-2
	Procurement by Component-----	A-3
	RDT&E/Procurement as Percent of DoD-----	A-4
	RDT&E by Mission Category-----	A-5
	RDT&E R&D Category-----	A-6
	RDT&E by Performer-----	A-7
	RDT&E by Defense Programs-----	A-8

TABLE OF CONTENTS CONTINUED

Page No.

Procurement by Defense Programs-----	A-9
Procurement by Appropriation-----	A-10

APPENDIX-B

Acronyms-----	B-1
---------------	-----

LIST OF FIGURES

		<u>Page No.</u>
FIGURE I-1	Military Expenditures: A Comparison of U.S. Military Expenditures with Estimated Dollar Cost of Soviet Expenditures (excluding retirement pay)	I-13
FIGURE II-1	Average Annual Production Ratios of Selected Weapons: USSR to U.S., 1977-1981	II-5
FIGURE II-2	Average Annual Production Ratios of Selected Weapons: WP to NATO, 1977-1981	II-5
FIGURE II-3	Number of U.S. and USSR New Weapons and Major Modifications Introduced Annually	II-7
FIGURE II-4	Strategic Forces: A Comparison of U.S. Procurement Cost with Estimated Dollar Cost of Soviet Procurement	II-7
FIGURE II-5	Intercontinental Attack Forces: A Comparison of U.S. Annual Procurement Cost and Estimated Dollar Cost of Soviet Procurement	II-9
FIGURE II-6	Strategic Defense: A Comparison of U.S. Procurement Cost with Estimated Dollar Cost of Soviet Procurement	II-12
FIGURE II-7	General Purpose Forces: A Comparison of U.S. Procurement Cost with Estimated Dollar Cost of Soviet Procurement	II-13
FIGURE II-8	General Purpose Land Forces: A Comparison of U.S. Procurement Cost with Estimated Dollar Cost of Soviet Procurement	II-14
FIGURE II-9a.	Tactical Aviation: Annual Production of Aircraft, All Mission Areas	II-16
FIGURE II-9b.	Tactical Aviation: A Comparison of U.S. Annual RDT&E Cost with Estimated Dollar Cost of Soviet RDT&E	II-16

LIST OF FIGURES CONTINUED

		<u>Page No.</u>
FIGURE II-9c.	Tactical Aviation: A Comparison of Annual Procurement Cost with Estimated Dollar Cost of Soviet Procurement	II-16
FIGURE II-10	General Purpose Fleets: A Comparison of the Replacement Costs of the U.S. Active Fleet with Estimated Dollar Costs of Soviet Active Fleet Replacement (Less Coastal Patrol, and Auxiliaries and Aircraft)	II-18
FIGURE II-11	General Purpose Fleets (Less Coastal Patrol, Auxiliaries and Aircraft): U.S. Annual Procurement Cost and Estimated Dollar Cost of Soviet Procurement	II-19

LIST OF TABLES

TABLE I-1	Production Summary of Selected Weapons for NATO and WP countries	I-12
TABLE II-1	Percentage of U.S. Military Production Assigned to U.S. Forces, 1977-1981	II-4
TABLE II-2	Strategic Intercontinental Forces: Dates of Weapon Introduction Since 1960	II-8
TABLE II-3	Strategic Defense. Dates of Introduction of Weapon Systems - Interceptors and SAMs	II-11
TABLE II-4	Relative U.S./USSR Standing in the 20 Most Important Basic Technology Areas	II-21
TABLE II-5	Relative U.S./USSR Technology Level in Deployed Military Systems	II-22

I. INTRODUCTION TO THE FY 1983 RD&A BUDGET AND PROGRAMS

Mr. Chairman and members of the Committee:

It is a pleasure for me to forward to you the Department's FY 1983 Research, Development and Acquisition (RD&A) Budget request.

In a department as large and complex as Defense it takes time to change the course of events. However, I believe you will see some important changes in our program. I'm sure you will detect our overall emphasis on modernization and readiness, and improving the acquisition process. We made a start toward these objectives last year in our amended FY 1982 budget. Our FY 1983 Research, Development and Acquisition (RD&A) program is needed to achieve these objectives.

The FY 1983 RD&A budget request of \$114 billion is the means by which we propose to complete key programs that are urgently needed in the near term for our deployed forces. It is the means by which we propose to invest in our long-term military strength by initiating new programs and maintaining the vitality of our technology base. It is the means by which we propose to make changes in the acquisition process, from planning through production, and to procure in sufficient quantities affordable weapons and support systems.

We have developed this program by evaluation and long-range planning of defense major mission areas. The program was developed both to correct near-term deficiencies and to provide long-term needs. The total program for each mission area is developed in an integrated comprehensive way, including C³I systems. It is important that we execute

the approved program with minimum changes to reduce the cost overruns caused by program changes and the other damaging effects of instability. I ask that you carefully review the program, and that the program approved this year be adhered to.

The challenge of achieving results is a personal one for me. For many years, I was a member of the Defense Science Board (DSB) which has made several analyses of the defense acquisition process. Many members of this committee recall the 1978 Report of the DSB Task Force on the Acquisition Cycle. That Task Force, which I chaired, identified the adverse trends in the length and inflexibility of the acquisition process and in the cost and performance of its products. We recommended several positive actions to reverse those trends. My predecessor, Dr. Perry, initiated many of those recommended actions. My statement today describes where further action is needed and why.

I wish to take this opportunity to discuss with this committee my philosophy toward research, development, and acquisition; my assessment of the critical problems we face; and the goals, priorities, and key thrusts I propose to address these problems. I'll start my overview with a brief description of my major responsibilities as the USDRE, my basic approach to carrying out those responsibilities, and the steps we have initiated and are planning to take to achieve our goals. Then I'll conclude with the primary emphasis in each major mission area. Chapters II-XI of my statement amplify each of these themes and initiatives in greater detail.

A. USDRE RESPONSIBILITIES

I'm responsible to the Secretary of Defense for three major areas. The first is to modernize our deployed forces. We can assess the need to modernize from many points of view. As far as I am concerned, the most important point of view is that of our combat personnel, who face superior quantities of increasingly capable Soviet equipment in almost every mission area. We must redress that situation. I won't be satisfied until we are actually producing and deploying equipment and support systems in quantities adequate to give our servicemen and women the means to achieve fully their assigned mission. I won't be satisfied until those deployed systems are more reliable, more supportable and more operationally ready than what we've fielded in the past and can be procured at a cost the country can afford.

How do we implement the needed force modernization? By improving our acquisition plans and process so that human and material resources are focused on modernization, and particularly on procurement. This relates to my second responsibility--managing defense acquisition. We've already taken many initiatives to improve the acquisition process and the organization of OUSDRE to support our objectives more effectively. Our main thrusts, which I'll describe more fully later, are to improve mission area planning, reduce cost growth, decrease hardware acquisition time, and increase program stability.

In addition to these initiatives, we've also taken steps described in Chapter IV to strengthen our industrial base and to build a spirit of cooperation between government and industry. Industry obviously has a vital role to play in strengthening the acquisition process and in

modernizing our forces. While there are clear and proper limits to our relationship with industry, we can and must do more to gain the benefits of a creative, competitive, and healthy industrial base.

The third of my responsibilities is to enhance the technology base. I view this objective as having two components. First, we must maintain superior science and technology which serve both as the source of our future procurements and as a hedge against adverse technological surprise. The long term importance of our technology base must not and will not be diluted by our emphasis on solving shorter term procurement problems. Second, we must apply our technology more effectively, and this means phasing it into our deployed systems more rapidly and efficiently. Superior technology in the laboratories that is not transitioned into deployed effective weapons makes no contribution to our military capability. One way I intend to approach this problem is to place more emphasis on evaluating the benefits of applying evolutionary, lower risk technologies to improve our equipment as an alternative to higher risk, higher cost solutions at the frontiers of technology.

These are my three major responsibilities. Each contains many challenges, and none of these challenges is new. What is new is the unique opportunity we now have to implement urgently needed improvements in our RD&A planning, programs, processes, and management. This opportunity is the result of this Administration's determination to improve our defense posture and to effect needed economies and efficiencies in the Government. It is the result of a recognition by the American people and the Congress of the seriousness of the long-term Soviet challenge and of the high priority this nation must place on meeting that challenge

successfully. It is also the result of resolve by the leadership in the Department to provide our forces in the field the quality and quantity of equipment they need. With the help of this Committee and the Congress, we intend to equip our young men and women in uniform with operationally ready and effective equipment that is required for the missions assigned.

B. APPROACHES TO RD&A IMPROVEMENTS

My approach to carrying out these responsibilities includes several major actions, many of which have already been initiated. These actions include the reorganization of the Office of the USDRE; initiation of long-range resource planning; improvements in the acquisition process; strengthening of the industrial base; improvements in developing and deploying technology; and insuring close cooperation with the Congress.

1. Reorganization of OUSDRE

I have proposed several organizational changes within my Office with the aim of exercising my major responsibilities more effectively. The proposed establishment of two Assistant Secretaries of Defense (ASD) reporting directly to me--one for Development and Support, and one for Research and Technology--will create a three man USDRE top management team, led by me, to set the standards and pace, and to move toward the objectives set by the Secretary of Defense in the critical areas of modernization, readiness, acquisition management, and the technology base.

The proposed Assistant Secretary of Defense for Development and Support would be responsible to me for the management of our modernization plans and programs, including mission area assessments, and for emphasizing readiness early in the R&D process including reliability, maintainability, sustainability and logistical support goals. He would assist me in

developing guidance on investment objectives to the Secretaries of the military Departments, and in providing all of the participants in the acquisition process with analyses of the investment balance and of the effectiveness of proposed investment programs in meeting broad mission needs. This proposed ASD for Development and Support would also serve as the Principal Deputy Under Secretary of Defense for Research and Engineering.

The proposed ASD for Research and Technology would assist me in managing our technology base--planning a comprehensive science and technology program, directing basic research, interfacing with the nation's technical and scientific community, and improving the transition of technology into our deployed systems. A key responsibility would be to assist the Services in developing advanced technology system options, and to use technology innovatively to increase total military force capability. He would also serve as the Director, Defense Advanced Research Projects Agency.

My office reorganization also places increased emphasis on integrating Command, Control, Communications, and Intelligence (C³I) capabilities into each major mission area. Each Deputy Under Secretary for a major mission area is now responsible for total system acquisition, including associated C³I and other support requirements, in his assigned mission area. I have assigned C³I specialists to each mission Deputy to support that expanded role. However, overall C³I coordination will be achieved by the Deputy Under Secretary for C³I who has "cross-cutting" authority to integrate C³I matters across all mission areas. Similar cross-cutting authorities have been assigned to the Deputy Under Secretaries for Acquisition

Management, Research and Advanced Technology, and International Programs and Technology; and to the Director, Defense Test and Evaluation.

2. Long-Range Resource Planning

I am emphasizing improving our long range resource planning as an important step toward establishing a comprehensive and coherent defense acquisition strategy; enhancing acquisition program stability; establishing realistic budget and cost goals; ensuring that mission area requirements including readiness, sustainability, and support functions are prioritized and addressed in both the near and far term; and establishing criteria for measuring progress. We have already applied resource planning projections in reviewing the FY 1983 Program Objectives Memorandum (POM) and in preparing the FY 1984-88 Five Year Defense Program (FYDP) and the FY 1984 Defense Guidance. With the assistance and participation of the OSD staff, the organization of the Joint Chiefs of Staff, and the Military Departments, we are establishing overall investment priorities for each mission area in the near and long term; we are identifying gaps, unresolved problems, and issues; and we are assigning action and giving guidance on how to address unresolved problems. Continued iterations will improve both our resource planning and its application to specific investment and programmatic areas. My new Assistant Under Secretary of Defense for Plans and Development will be responsible for developing and coordinating long-range resource planning.

3. Improvements in the Acquisition Process

Our efforts to reduce acquisition costs and to shorten the acquisition process in order to deploy adequate quantities of needed systems that are operationally effective and ready, require the completion

of several actions that are summarized below and discussed more fully in Chapter III, Acquisition Strategy.

a. To reduce acquisition costs

- o Increase program stability by realistically costing and adequately funding R&D and procurement.
- o Implement multi-year procurement to improve productivity, increase economy-of-scale lot buying and improve industrial responsiveness. The F-16, the C-2 aircraft, and the Troposcatter Radio program were authorized multi-year programs in FY 1982, and many more programs are being considered in FY 1983.
- o Use competitive R&D and procurement where appropriate to reduce costs.
- o Reduce administrative costs by simplifying procedures, seeking relief from costly legislative requirements, and reducing the number of DoD regulations and directives.
- o Provide incentives for capital investment to increase productivity in the defense industry.
- o Use economic production rates to reduce unit costs and decrease acquisition time. For example, the production rates of the F-15, KC-135, and the TOW missile were increased.
- o Improve budgeting for inflation and technological risk to reduce cost overruns and increase program stability.

b. To shorten acquisition time:

- o Implement Preplanned Product Improvement to reduce costs, decrease acquisition time, and field mature advanced technology more rapidly with block change upgrades to deployed subsystems.
- o Provide adequate "front end" funding for test hardware and software.

c. To improve weapons support and readiness:

- o Establish readiness and sustainability objectives early in development programs.

- o Provide incentives to contractors to attain reliability and maintainability goals.
 - o Provide adequate front-end funding for assessing reliability and supportability goals and for correcting known deficiencies.
- d. To improve the DSARC process:
- o Move toward controlled decentralization of the acquisition process to the Services. For example, we have reduced the number of required DSARC reviews.
 - o Reduce the data and briefings required by the Services and other DoD staffs.
 - o Integrate the acquisition process with the Planning Programming and Budgeting System (PPBS) to increase stability. For example, all new starts are reviewed together by the Defense Resources Board.

Many of these actions were assigned to me by the Deputy Secretary of Defense in April 1981, and we have made steady progress in their implementation. The real payoff--deploying adequate quantities of operationally effective systems--remains ahead. I have targeted this as my personal challenge and request your support. I will keep the committee fully advised as to our progress.

4. Strengthen the Industrial Base

Although it is clear that healthy, innovative, and competitive industrial capability is necessary for a strong defense, the U.S. defense sector is suffering from lagging productivity, low return on investment, and cash flow problems that are due, in part, to government contracting and payment practices and program instability. Accordingly, we have initiated several programs to create a climate of constructive teamwork between industry and defense, and to strengthen the industrial base. I will describe these programs and our progress in Chapter IV, but some major thrusts of our efforts are as follows:

- o Enhance productivity by providing incentives for capital investments and more balanced risk sharing.
- o Increase production rates.
- o Provide incentives for industry to project costs accurately and to attain reliability, supportability and cost goals.
- o Reduce administrative costs and time for procurements through significantly reduced regulations, directives, and paper-work.

5. Deploying our Technology More Effectively

Getting our technology into the field rapidly to meet mission requirements has been a USDRE goal, but progress has not been satisfactory.

I intend to give much greater emphasis to ensuring that we realistically assess the opportunities afforded by evolutionary technological alternatives in new programs that can satisfy essential requirements at lower risks and cost, reduce development time, and increase reliability and supportability. The concept we intend to apply is Pre-planned Product Improvement (P³I). P³I proceeds with the development of lower technical risk systems, and then inserts mature advanced technology into deployed systems through upgrades of those subsystems that offer the greatest overall benefits. The payoff is reduced lead time to fielding technological advances while obtaining significant improvements in military capability during the service life of the system

C. THE MILITARY INVESTMENT BALANCE

I have already mentioned the serious force imbalances that face our forces today. This situation is not new; it results from over a decade of growing military investment imbalances favoring the Soviets. The quantitative and qualitative trends also continue to be unfavorable,

and our projections of broad RD&A indicators show that the future balance will probably worsen despite a significant increase in U.S. military investment patterns.

This is of great concern to me. I believe the members of this committee are concerned, and anyone who reads my assessment of the Acquisition and Technology balance in Chapter II will be concerned. To summarize briefly, we are seeing the products of a steady and persistent Soviet force modernization program that combines the historic Soviet emphasis on producing large quantities of military equipment with their more recent successful efforts to field more sophisticated and capable systems. Our past technology lead can no longer offset the quantity deficiency by itself--the numerical disadvantage in most categories of weapons is too great, and our advantage in most deployed technologies is too small. This is the reason for our emphasis in the FY 1983 RD&A budget and programs on deploying increased quantities of operationally effective systems as rapidly as possible, and on increasing our ability to infuse our emerging technology into deployed systems more rapidly.

The situation developing in the field can be seen by a comparison of military equipment being produced and deployed. Table I-1 summarizes the annual production of several major classes of weapons. It shows that the Soviets have maintained a military production advantage of well over two to one in most classes of weapons, and that while NATO's production alleviates the imbalance, the Warsaw Pact still enjoys a significant superiority.

TABLE I-1 Production Summary of Selected Weapons for NATO^a and WP Countries

WEAPON	1977-81 ANNUAL AVERAGE PRODUCTION RATIO		1981 PRODUCTION RATIO	
	USSR:U.S.	WP:NATO	USSR:U.S.	WP:NATO
ICBMs	15:1	11:1	b	40:1
SLBMs	4:1	3:1	2.5:1	2.5:1
SSBNs	b	b	2:1	2:1
TANKS	2.5:1	2:1	4:1	2:1
OTHER ARMORED VEHICLES ^c	5:1	2:1	11:1	3:1
ARTILLERY (100 mm AND OVER)	13:1	8:1	6:1	5:1
TACTICAL COMBAT AIRCRAFT ^d	2:1	1:1	1.5:1	1:1
MILITARY HELICOPTERS	3:1	1.5:1	3:1	1.5:1
SAMs (NOT MAN-PORTABLE) ^e	19:1	6:1	78:1	5:1
MAJOR NAVAL SURFACE COMBATANTS (OVER 1000 TONS)	1:1	1:2	2:3	3:4
ATTACK SUBMARINES	2.5:1	1:1	4:5	1:2

^aIncludes France^bNo U.S. production^cIncludes light tanks, infantry combat vehicles, armored personnel carriers, reconnaissance vehicles, and fire support and air-defense vehicles^dIncludes tactical fighter, attack, reconnaissance, electronic warfare, and all combat-capable tactical training aircraft^eU.S.S.R. and WP figures include SAMs for other countries

The situation appears even worse in the longer term. Figure I-1 compares military expenditures. The investment (procurement, RDT&E, and military construction) imbalance in Figure I-1b is striking--1981 marks the fifth consecutive year in which estimated Soviet military investments were approximately double our own. During the last ten years the cumulative Soviet advantage in aggregated military investments has grown to about \$440 billion. The results of that enormous asymmetry will most likely appear in the form of even greater quantitative and qualitative imbalances that may have serious implications for our own security and that of our allies.

I would also call the Committee's attention to the fact that the estimated dollar costs of Soviet military Research, Development, Test and

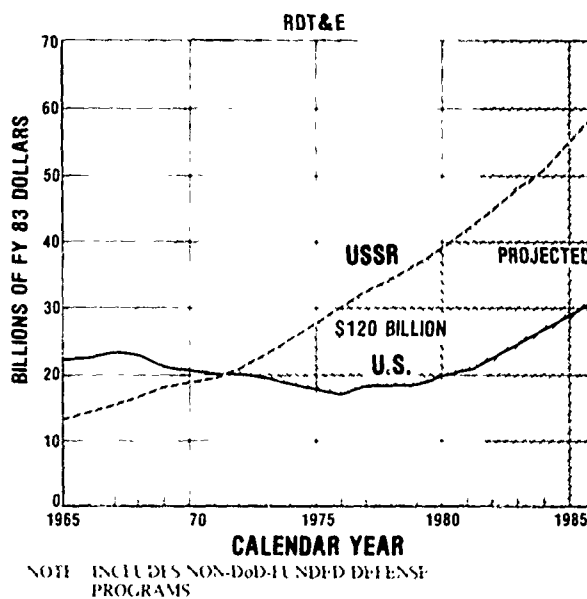
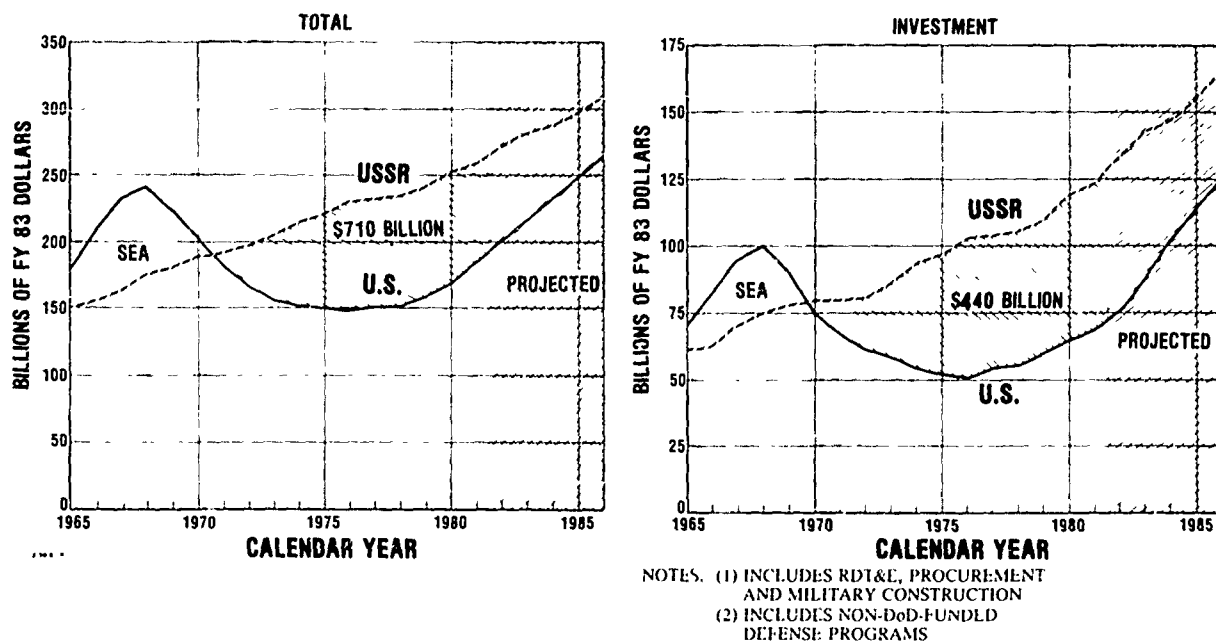


FIGURE I-1. Military Expenditures: A Comparison of U.S. Military Expenditures With Estimated Dollar Costs of Soviet Expenditures (excluding retirement pay)

Evaluation (RDT&E), which has been increasing at about 7% per year since 1970, has also been growing relative to total Soviet military investments during the past six years. We expect this relative growth to continue, indicating the importance the Soviets place on closing technology gaps.

The Soviets are also continuing their broad, intensive, and well funded program to acquire the West's advanced technologies through espionage and by exploiting inadequately controlled transfers abroad. Soviet leaders have viewed technological transfer as an important element in developing their military/industrial base, and, quite frankly, our fragmentary and uncoordinated program of controls has seldom denied them success. I have placed high priority on reducing the loss of critical technologies to the Soviet Union. Our efforts are described in more detail in Chapter V.

My assessment of the military RD&A balance is contained in Chapter II which contains quantitative indicators of the acquisition balance. We must compensate for the Soviet advantages by making our relative strengths pay off in the field. We have not been successful enough in the past. We must do better, and do better quickly.

D. MAJOR RD&A THRUSTS

In evaluating each mission area we have looked across Service lines to determine ways in which the Services can work jointly to more efficiently meet the mission area requirements. Examples of this are: Air Force contributions to fleet air defense, use of land-based B-52s in sea control; and Army contributions to the interdiction and air-base attack missions. We will continue to explore ways in which the Services can jointly meet mission requirements more efficiently.

Chapters VII-XI of this statement describe the RD&A priorities, objectives, and programs in each major mission area. I will emphasize below only the most critical issues in each.

1. Strategic and Theater Nuclear Forces

Enhancing the capability, survivability, and responsiveness of our Intercontinental Ballistic Missile (ICBM) force, and the sea-based and air-based elements of the Triad is critical to the maintenance of an adequate deterrent posture. The demands on our strategic forces have been increased by the Soviet deployment of many new strategic systems. This requires us to improve deterrent capabilities, including the high priority issues involving Command, Control, Communications and Intelligence (C³I), so that they could endure beyond the initial exchanges of a nuclear war. The requirements for an enduring force--that can survive an attack and be effectively employed through all phases of a conflict--are essential for credible deterrence. These requirements are greater and more demanding than those necessary for just an initial exchange. Our FY 1983 strategic force modernization program addresses these requirements. We have developed the strategic package as a total program, including significantly improving the integration and management of the strategic C³I systems. It should be evaluated in that context.

Our Theater Nuclear Force (TNF) modernization program places primary emphasis on implementing a long-range program of deploying Ground Launched Cruise Missiles (GLCM) and Pershing II to deter Soviet use of theater nuclear weapons. The major emphasis in the TNF program is to improve the survivability and responsiveness of U.S. TNF systems.

For the purpose of arms control negotiations these nuclear forces are categorized as intermediate range, short range, defensive and maritime nuclear forces. In this statement I have retained the mission area definitions currently in use.

In all of these areas we would welcome a verifiable arms control treaty that would result in lower levels of defense spending while maintaining U.S. security. Strategic and TNF programs are discussed in Chapter VII.

2. Chemical Warfare

The importance of improving--I am tempted to say creating--an effective chemical warfare capability is discussed in Chapter IX. The Soviets are ready and apparently willing to employ chemical weapons. Long standing deficiencies in our current retaliatory and defensive capabilities encourage rather than deter Soviet use. We recognize this critical deficiency in U.S. deterrent capability and have proposed a major increase in our resources applied to chemical warfare. We are emphasizing the production of defensive systems and retaliatory chemical munitions, and increasing the readiness and sustainability of our stockpiles and weapons.

3. Tactical Warfare

Our RD&A priorities in the tactical mission areas are focused on three primary objectives: to deploy adequate numbers of a mix of weapons capable of sustaining successful operations in a highly mobile combat environment; to increase our ability to deploy forces rapidly in response to hostile military actions which jeopardize our interests anywhere in the world; and to improve our coalition war fighting and regional defense capabilities by increasing the interoperability

and complementarity of U.S. forces with those of our allies and friends. A primary emphasis will be to reduce cost growth of major systems. Chapter VIII describes major thrusts in the tactical mission areas in more detail.

4. C³I

Three factors have created a dramatic increase in the need for and the priority we are giving to modernizing our C³I capabilities. First, the increased emphasis we are placing on the responsiveness, mobility, and sustainability of our strategic and tactical forces requires more flexible, reliable, and enduring C³. Second, the need to further integrate the operations of available forces requires improved standardization, interoperability, and connectivity of C³ assets and those of our allies. Third, improvements in Soviet Electronic Warfare capabilities require C³I capabilities that are significantly more resistant to Soviet exploitation, jamming, and electronic combat, and that can be rapidly reconstituted if degraded.

We have accordingly assigned the same priority to our C³I system modernization as that given to new weapon systems, and are working to integrate C³I acquisition with the weapons supported. This modernization program is described in Chapter X.

5. Science and Technology

I have already described the importance I am placing on speeding the transition of U.S. technology to deployed military systems. To do this, we need to improve our methods of relating the highest payoff

technology areas in our basic and applied research programs to mission area requirements, and then apply sufficient resources to move them through the development process expeditiously.

We must also improve our coordination and planning of cross-Service technologies so as to reduce unnecessary redundancy and exploit more fully promising developments that, in some cases, are receiving piecemeal support. The erosion of our technology base is a national problem and we are working the broader problem to determine what we can do to ensure the U.S. maintains a technological edge. Specific science and technology programs are described in Chapter VI.

6. Cooperation with the Congress

The achievement of our goals depends upon Congressional approval of our programs and the resources needed to implement them. I intend to work closely with this and other cognizant Congressional committees and their staffs to ensure that our RD&A programs are adequately explained and justified. What I ask in return is prompt action in a number of areas to redress serious quantitative and qualitative imbalances in deployed systems. And once we make decisions, we must stick with them to reduce program instability, which has been one of the most serious causes of cost overruns. I urge your support for these efforts.

The FY 1983 RD&A budget and programs balance critical needed improvements in our near term capabilities with investments to meet essential long term mission requirements. Achieving this has not been easy, for it is clear we cannot close all of the gaps in our capabilities

in the immediate future. We have had to make difficult choices to ensure that the FY 1983 program addresses the defense priorities established by the President. I can assure this committee that the budget and programs we are requesting are critical, and that the 7% real increase in our FY 1983 budget request represents an investment the nation needs to make. I request your support for this program.

II. NET BALANCE--MILITARY EQUIPMENT AND TECHNOLOGY

A. INTRODUCTION

In this section I compare overall indicators of the USSR/Warsaw Pact (WP) and the US/NATO alliances' efforts to develop and produce military weapons. I compare the research, development and procurement process, and also examine trends in military expenditures. Included is a comparison of the quantities of military equipment developed, produced and deployed as well as a comparison of the status of the underlying technologies. Other factors, of course, are important in measuring the overall military balance. These factors include economic strength, geographical and basing factors, the capabilities of production bases, the state of leadership, training and morale of the military personnel and the strength and dependability of allies to list a few. But, military investment and acquisition of modern weapons is fundamental to military strength and is a highly visible component of deterrence and an important leading indicator of the balance of the future.

B. WEAPONS R&D AND PROCUREMENT PROCESS

As early as 1929 the Politburo decreed that the Red Army should have no fewer troops than its probable enemies in the main theater of war, and should be stronger than the enemy in the decisive forms of armament--aircraft, artillery and tanks. The Soviets still emphasize acquisition of large quantities of armaments that now include nuclear weapons and a wide variety of missiles.

Stability and continuity characterize the large and steadily growing Soviet military development bureaucracy and supporting design

institutes, industrial ministries and production facilities. The Soviet military R&D management system is characterized by continuity of funding and personnel, strong centralized authority and the direct involvement of top leaders. The Soviet economic and R&D systems require that design teams and supporting workers be continuously employed turning out a steady stream of improved systems. The economic burden of defense in the Soviet Union is heavier than ours, but viewed in the light of historical experience it is given high priority and enjoys a privileged position because it is the major bulwark of Soviet power and influence.

To be able to sustain their long-term rate of military expenditure increases shown in Figure I-1 in the face of growing economic difficulties, the Soviets will probably have to assign an increasing share of their GNP to defense. We believe Soviet economic problems will not substantially threaten the military portion of national resource allocation.

In years past the Soviet weapons development process has been evolutionary and emphasized continuing modifications and improvements to existing proven weapons. However, it is now evident that the USSR is improving its capability to introduce innovative weapons exploiting advanced technology, although these weapons usually require somewhat longer development times. The U.S. capability to produce weapons of consistently superior technical performance (quality) is now threatened by the growing USSR competence in exploiting and deploying advanced technologies.

One U.S. advantage is the broad technology base that is well established and expanding in our civilian economy. The strength of U.S. military RDT&E lies in its technical competence and productivity as a result of the competitive incentives of American industry. Competition and the relatively open debate throughout the entire U.S. acquisition cycle encourages identification and development of the best ideas and products.

The U.S. economy has considerable capacity for expansion of defense efforts. Except for strategic and nuclear weapon systems, U.S. industry produces substantially more weapons than are assigned to U.S. military forces. Foreign military sales, grant aid and other transfers are often a major part of U.S. military production. Table II-1 shows the fraction of total U.S. military production actually assigned to U.S. forces. The Soviet Union also exports some of the military equipment it produces.

C. THE BALANCE OF MILITARY EQUIPMENT AND INVESTMENT

This section provides indicators of U.S. and USSR military research, development, procurement and investment for major defense categories.

Comparisons of the military expenditures of the U.S. and the USSR are necessarily approximate because of lack of knowledge of Soviet expenditures and the great differences in our military and economic structures. We attempt to assess the size of Soviet defense effort by estimating what it would cost the United States, using U.S. processes, techniques and management procedures, to develop and procure the Soviet military equipment. These dollar cost estimates

TABLE II-1. Percentage of U.S. Military Production
Assigned to U.S. Forces, 1977-1981

	FOR U.S. FORCES	BY U.S. PRODUCERS	U.S. FORCES PERCENT
ICBM/SLBM	329	329	100
SSBN	1	1	100
THEATER NUC. MSLS.	637	757	84
SURFACE COMBATANTS	49	50	98
SSN	17	17	100
TANKS	3,887	4,299	90
OTHER ARMORED VEH.	4,666	9,251	50
ARTY AND ROCKET	686	1,616	42
AA ARTY	0	736	0
SAMs	7,738	16,172	48
TACTICAL COMBAT A/C	1,813	2,687	67
MILITARY HELICOPTERS	874	1,203	73

8-7-81-28

provide a consistent and intelligible measure of the Soviet military effort. They are particularly indicative of trends or changes in the size of the effort over the years but are not an alternative source of budget information.

1. Weapons Produced Annually

Figures II-1 and II-2 show comparisons of the average annual production of the major armament elements of military power, both for the U.S. and USSR and for NATO and the Warsaw Pact. In every case the USSR has substantially outproduced the U.S. in the period 1977-1981, not only in terms of the total weapons produced BY it for all users, but in terms of the weapons produced FOR its own

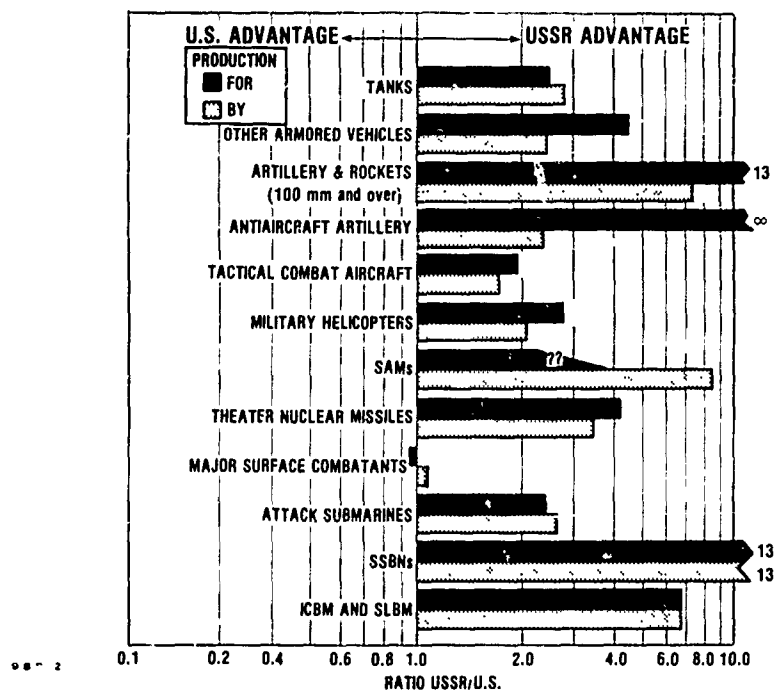


FIGURE II-1. Average Annual Production Ratios of Selected Weapons: USSR to U.S., 1977-1981

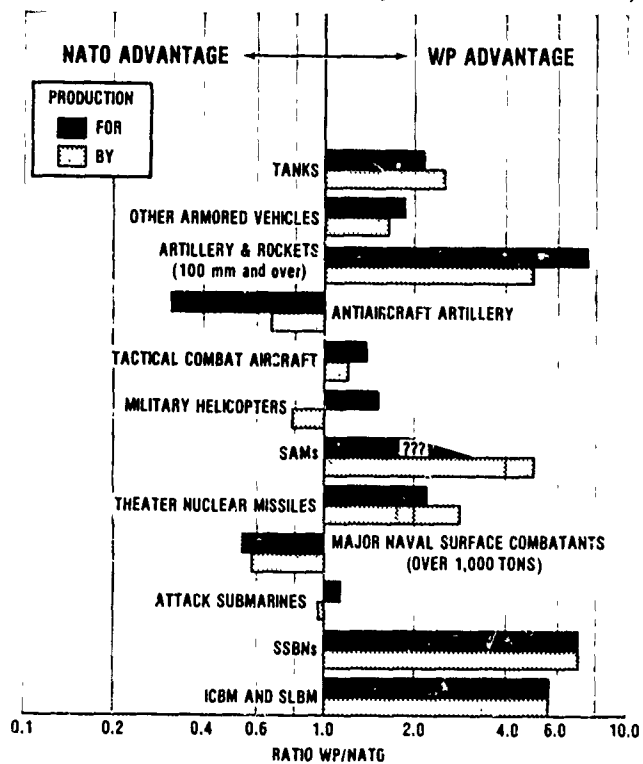


FIGURE II-2. Average Annual Production Ratios of Selected Weapons: WP to NATO, 1977-1981

forces. The situation is improved in part when NATO acquisition is compared with that of the Pact.

2. Weapons Introduced Annually

Comparing the output of national military RDT&E programs involves a variety of measures. One such measure is the simple count of new weapons, together with weapons given major improvements, that are introduced into the operational inventory annually. Figure II-3 gives the count of a comparable set of major strategic and tactical weapons introduced each year since 1960.

Despite the USSR's apparently greater investment in R&D, the United States produces approximately as many new weapons and major modifications. The U.S. tends to add fewer weapons each year whereas the USSR output is nearly constant each year even as weapon complexity and sophistication increase. The USSR introduces many more moderate and minor modified weapons into the operational inventory than the U.S.

3. Strategic Forces

Figure II-4 shows that over the ten-year period, 1972-1981, the estimated cumulative dollar costs of Soviet strategic force procurement exceeded that of the United States by about \$130 billion (in constant 1983 dollars) which is nearly twice the total U.S. procurement for strategic forces for the same period. About 30 percent of Soviet procurement in this period was for strategic defense. In the early 1970's the strategic forces of the two superpowers were considered to be at parity.

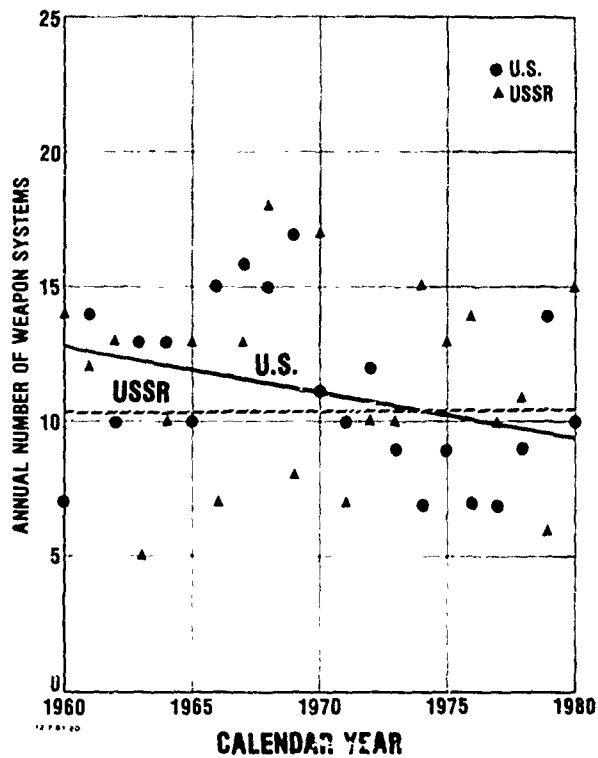


FIGURE II-3. Number of U.S. and USSR New Weapons and Major Modifications Introduced Annually

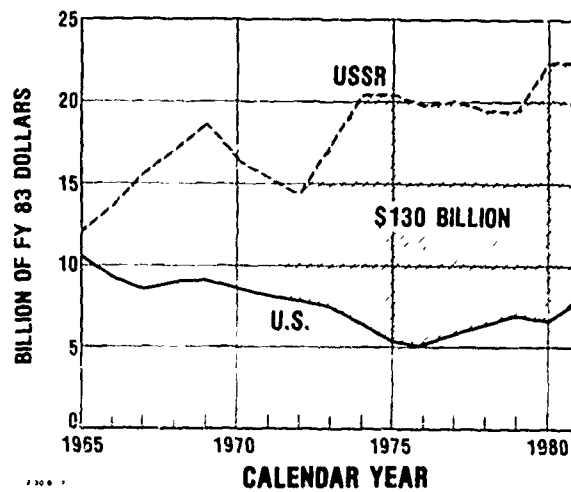


FIGURE II-4. Strategic Forces: A Comparison of U.S. Procurement Cost with Estimated Dollar Cost of Soviet Procurement

TABLE II-2. Strategic Intercontinental Forces: Dates of
Weapon Introduction Since 1960

U.S.		USSR	
WEAPON	DATE INTRODUCED	WEAPON	DATE INTRODUCED
ATLAS	1960	SS-6	1960
POLARIS A1/A2/A3	1960-1964	SS-N-4	1960
B-52H	1961	SS-7-1/2	1962-1963
TITAN I/II	1962-1963	SS-8	1963
MINUTEMAN I/II/III	1963-1970	SS-N-5	1963
POSEIDON C3	1971	SS-9-1/2/3/4	1966-1971
FB-111A	1971	SS-11-1/2/3	1966-1973
TRIDENT C4	1979	SS-N-6-1/2/3	1968-1972
		SS-13-1/2	1969-1972
		BACKFIRE	1974
		SS-N-8-1/2	1973-1977
		SS-16*	1977
		SS-17-1/2/3	1975-1979
		SS-18-1/2/3/4	1974-1979
		SS-19-1/2/3	1975-1979
		SS-N-18-1/2/3	1978
		SS-N-20	1981

*Not deployed.

11-16-81-8

a. Strategic Intercontinental Offense.

These forces consist of intercontinental bombers, intercontinental ballistic missiles (ICBM), submarine-launched ballistic missiles (SLBM) and the associated submarines (SSB/SSBN). The order of introduction of new weapons is listed in Table II-2.

Figure II-5 shows that the USSR devotes primary emphasis to its ICBM force, whereas the U.S. force is structured around a roughly balanced triad force of ICBMs, SLBM and bombers. Altogether

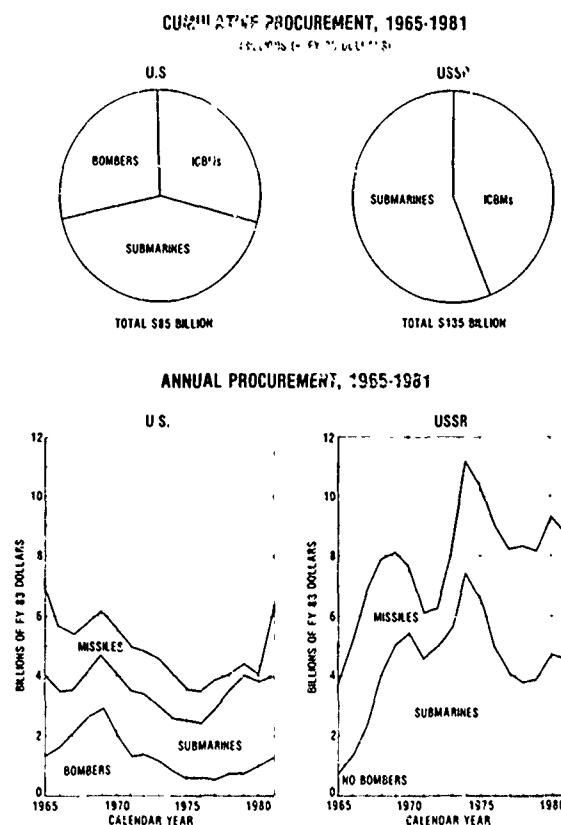


FIGURE II-5. Intercontinental Attack Forces: A Comparison of U.S. Annual Procurement Cost and Estimated Dollar Cost of Soviet Procurement

the Soviets have introduced more new and modified strategic weapon systems. While we have introduced no new ICBMs since 1970, the USSR has developed and introduced three new ICBMs in the same period.

From 1970 to 1980 the USSR commissioned over 50 SSB/SSBNs and the United States none. The USSR has recently introduced a new class SSBN, the Typhoon. The first Trident submarine was commissioned in November 1981. Most U.S. strategic submarine investment outlays during the 1970s went to modernizing existing submarines with new missiles.

Although there are indications that it may change in the future, the USSR has invested relatively little in intercontinental manned bombers. The approximately 200 Backfire bombers, first observed in 1969, although well suited for peripheral and naval strike operations, have limited capability for intercontinental attack although they could be used in one-way missions. The cost of Backfire is not included in strategic intercontinental forces.

Over the 1965-1981 period, the estimated dollar cost of procurement for Soviet strategic intercontinental forces was about \$135 billion (in 1983 prices), about 60 percent more than U.S. outlays for comparable forces. In the last ten years, however, the Soviets have spent twice as much as the U.S. for strategic intercontinental attack procurement. There is considerable difference in the direction and pace of Soviet and U.S. investment programs as shown in Figure II-5.

Plans to modernize U.S. strategic intercontinental systems call for increased annual investment outlays. These programs include the MX missile, the Trident SSBN and SLBM, air-launched cruise missiles to be carried by B-52s and the B-1B bomber.

b. Strategic Defense

The purpose of strategic defense is to enhance the survivability and durability of strategic resources--the National Command system network, strategic retaliatory forces, military forces and bases, and civilian population and industry.

Table II-3 gives the dates of introduction of new strategic defense weapon systems. Two differences are evident. The Soviets have introduced more weapons since 1960 and have made more modifications to each weapon.

TABLE II-3. Strategic Defense: Dates of Introduction of
Weapon Systems—Interceptors and SAMs

U.S.		USSR	
WEAPON	DATE INTRODUCED	WEAPON	DATE INTRODUCED
F-86	1948	FAGOT (MiG-15/Bis)	1950
F-89 A/B/C/D/H/J	1951-1958	FRESCO A/B/C/D (MiG-17)	1952-1955
NIKE AJAX	1953	SA-1	1954
F-100 A/F	1954-1957	FARMER A/B/C/D/E/G (MiG-19)	1955-1970
F-102A	1954	FISHPOT B/C (SU-9/SU-11)	1959-1962
F-101A	1957	SA-2/b/c/d/e/f	1959-1968
NIKE HERCULES	1958	SA-3	1961
BOMARC	1958	FIREBAR A/B (Yak-28P)	1964
F-104 A/B	1958	FIDDLER (TU-128)	1966
F-106A	1959	SA-5	1967
HAWK	1960	ABM-1B	1968
F-4E*	1964	FLAGON A/D/E/F (SU-15)	1967-1975
SAFEGUARD	1975	FOXBAT A (MiG-25)	1970
F-15*	1981	FLOGGER B/E/G (MiG-23)	1972-1978
		SA-10	1981

*Initially in Tactical Aviation

11-16-81-9

Figure II-6 shows comparative estimates of strategic defense annual procurement costs. The foremost Soviet strategic defense capability has been its extensive air defense network against U.S. bombers. The Soviets, also facing bomber threats from China, France and the United Kingdom, have invested heavily in strategic air defense. In the U.S. a strong bomber defense was not considered warranted without a defense against the major threat, ballistic missiles. Soviet investment for strategic air defense forces has been several times the U.S. investment

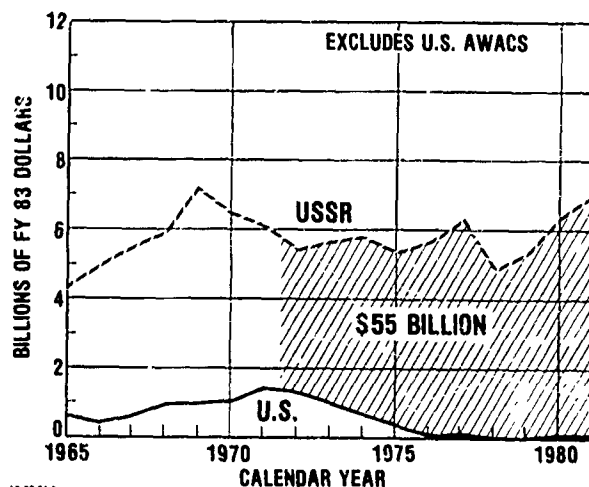


FIGURE II-6. Strategic Defense: A Comparison of U.S. Procurement Cost With Estimated Dollar Cost of Soviet Procurement

for strategic bombers between 1965 and 1980 providing favorable leverage for the U.S. in this category.

4. General Purpose Forces

General Purpose Forces, often called Conventional Forces, are composed principally of Ground Forces, Tactical Air Forces, and Naval Forces. Annual production of selected weapons for these forces was shown in Table I-1.

The Soviet Armies, Frontal Aviation and Navy have all been engaged in a comprehensive program of modernization and expansion. The estimated annual dollar cost for procuring Soviet general purpose force equipment has almost doubled since 1965 (see Figure II-7). Over the 1972-1981 period, cumulative Soviet general purpose force procurement exceeded that of the United States by approximately \$130 billion.

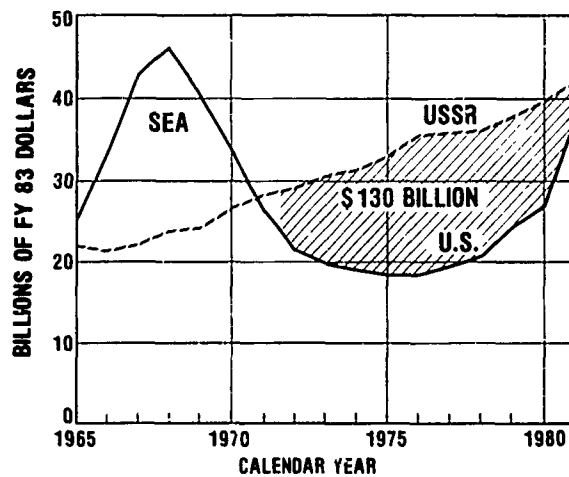


FIGURE II-7. General Purpose Forces: A Comparison of U.S. Procurement Cost With Estimated Dollar Cost of Soviet Procurement

a. Ground Forces

Soviet Ground Forces have the largest manpower component of the Soviet Armed Forces. Improvements to these forces range over the full range of tactical capabilities involving mobility, fire power, armor, chemical, biological and radiological protection, redundant and hardened command and control, obstacle crossing capability, air defense, electronic warfare and logistic support.

Figure II-8 shows that in the recent decade, cumulative dollar estimates of Soviet procurement costs for land force equipment were over three times those for U.S. forces. Although annual Soviet procurement expenditures were only 40 percent higher than the U.S. in 1970, they are nearly twice as great now.

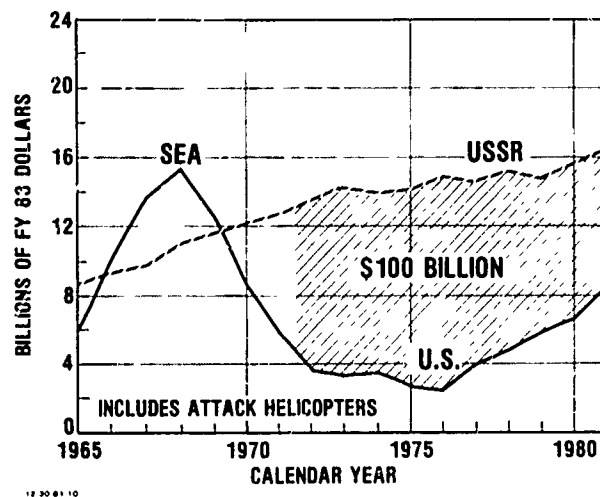


FIGURE II-8. General Purpose Land Forces: A Comparison of U.S. Procurement Cost With Estimated Dollar Cost of Soviet Procurement

Tank production for the Soviets has averaged about 2,300 per year and for the United States has peaked at about 900. Other armored vehicle production for the Soviet army is over 4,000 annually compared to less than 800 for the U.S. forces. The Soviets also far outproduce us in artillery. Much the same theme applies to other weapon production. A comparison of USSR/U.S. production ratios was shown in Figure II-1, and a similar comparison of NATO and the Warsaw Pact was shown in Figure II-2.

b. Tactical Aviation

In this category are all aircraft that can engage in combat at or beyond the forward edge of the battle area. For the Soviets this includes frontal and naval aviation, and for the U.S. it includes tactical aviation of our Air Force and Navy and attack helicopters of our Army.

Since 1965, the U.S. has produced more tactical fighters and attack aircraft than the USSR, but now as we approach parity in force levels the USSR is outproducing us (see Figure II-9a). The modernization of Soviet Frontal Aviation is substantial. This comes in part from the stepped up RDT&E outlays in this category (see Figure II-9b). This figure also reflects that a new Soviet attack aircraft, originally expected in mid-decade, is now operational. In addition to increased Soviet RDT&E expenditures, the estimated dollar cost for Soviet procurement of tactical aviation is now about double that of the United States (see Figure II-9c).

In order to meet a broad range of mission requirements, the United States has generally kept a greater variety of tactical aircraft types in production at any one time than has the Soviet Union. For tactical fighters we have averaged, since 1965, nearly four types in production at one time, whereas the Soviets have averaged only two (ignoring modifications).

c. Naval Forces

Although the USSR has substantially more surface combatant ships than the U.S. Navy, the U.S. overall displacement tonnage including carriers exceeds that of the USSR.

The Soviet navy investment strategy differs substantially from that of the United States. The estimated replacement value of the active fleet (or inventory value or undiscounted "book" value) over the period 1965-1981 has been essentially the same as that of the United States. However, half the dollar value of the Soviet inventory is in attack submarines, whereas half the value of the U.S. inventory is roughly

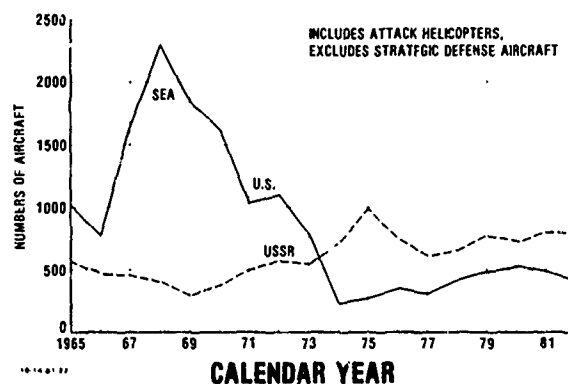


FIGURE II-9a. Tactical Aviation: Annual Production of Aircraft, All Mission Areas

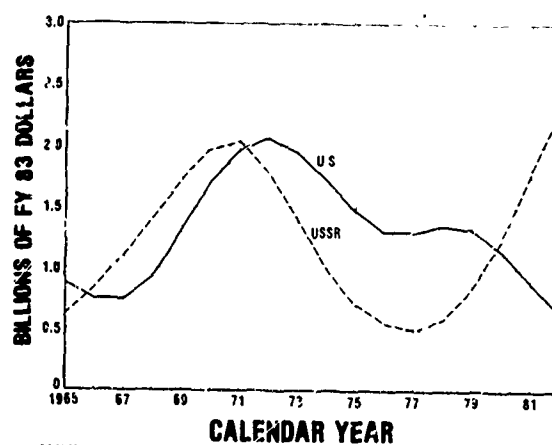


FIGURE II-9b. Tactical Aviation: A Comparison of U.S. Annual RDT&E Cost with Estimated Dollar Cost of Soviet RDT&E

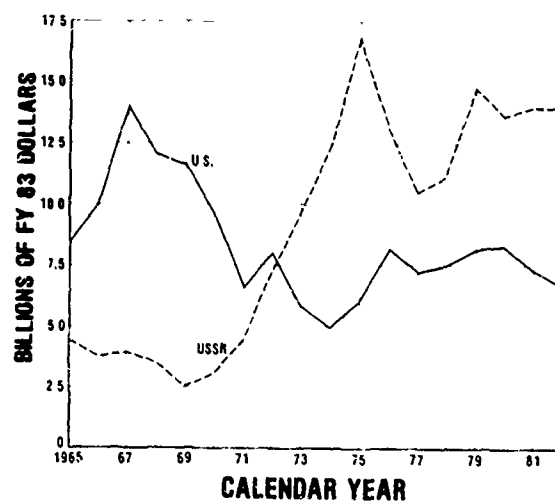


FIGURE II-9c. Tactical Aviation: A Comparison of Annual Procurement Cost with Estimated Dollar Cost of Soviet Procurement

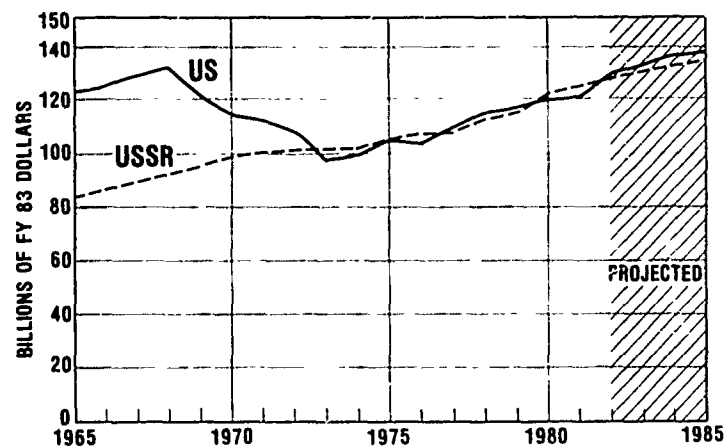
equally distributed between attack submarines and carriers (see Figure II-10).

Figure II-11 shows that total U.S. and USSR estimated procurement outlays for general-purpose naval vessels were roughly similar in 1965-1977. In that period, the major differences lay in greater U.S. aircraft carrier procurement, the larger amount of U.S. amphibious procurement, the lack of U.S. mine warfare procurement, and greater Soviet attack submarine procurement.

During the most recent decade, 1972-1981, estimated dollar costs of Soviet general-purpose naval force procurement have been about \$13 billion more than corresponding U.S. outlays, if U.S. multipurpose aircraft carriers and their aircraft are excluded. However, U.S. naval force procurement costs in this period exceeded the dollar costs of Soviet procurement by about \$21 billion, if U.S. carriers and their aircraft are included. The Soviets are now emphasizing carrier aviation.

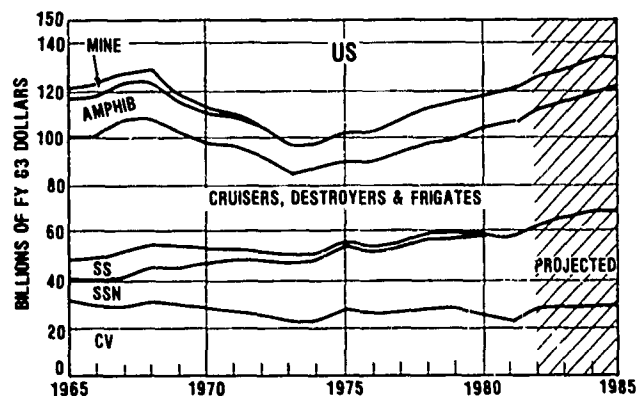
Until approximately 1977 the Soviet Union and the United States were estimated to have spent at similar rates for nuclear attack submarines. Since then the Soviets are estimated to be spending at a significantly higher rate for SSNs. Further, the Soviets are still estimated to spend an additional \$0.5 billion/year on diesel submarines and have introduced a new diesel submarine class, the Kilo, in 1981.

The sharp increase in estimated Soviet general purpose naval spending in the late 1970s and early 1980s, and the wide gap over U.S. spending, could lead to pronounced force level advantages to the USSR by the mid and late 1980s.



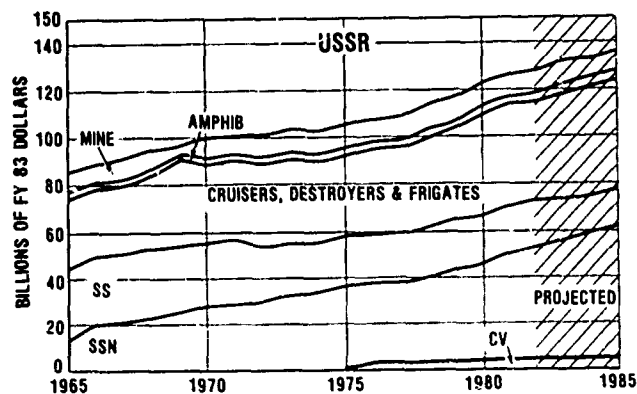
6 29 81-15

Figure II-10a



6-29 81-13

Figure II-10b



6 29 81 14

Figure II-10c

FIGURE II-10. General Purpose Fleets: A Comparison of the Replacement Costs for the U.S. Active Fleet With Estimated Dollar Costs of Soviet Active Fleet Replacement (Less Coastal Patrol, and Auxiliaries and Aircraft)

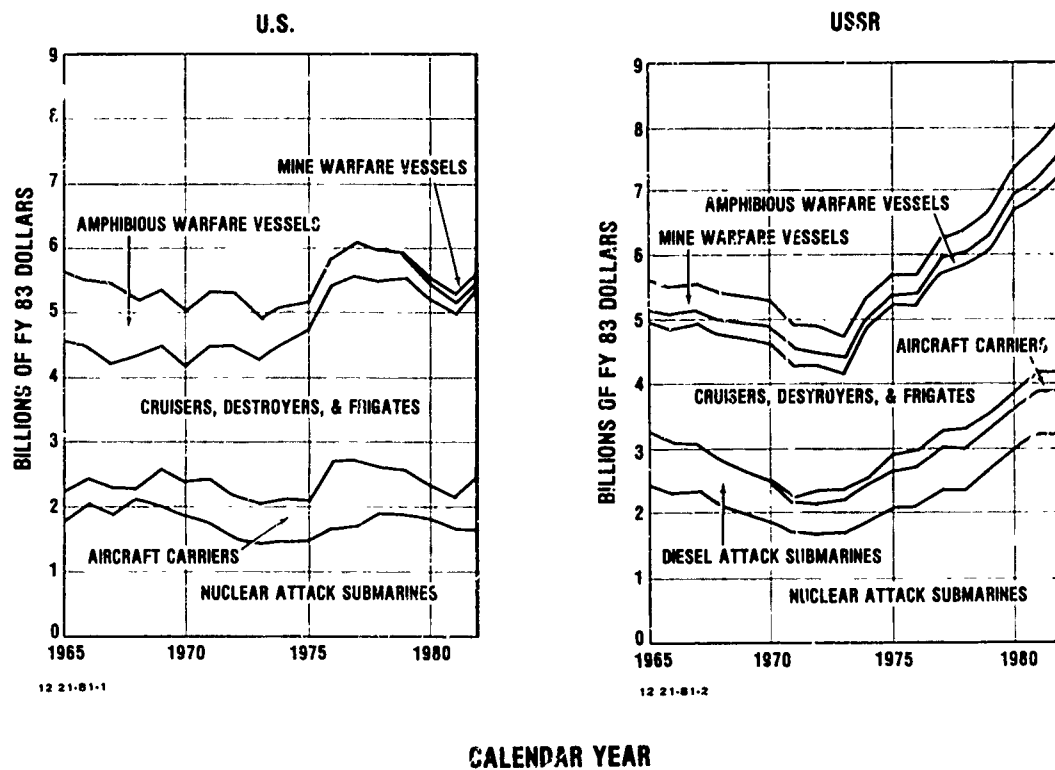


FIGURE II-11. General Purpose Fleets (Less Coastal Patrol, and Auxiliaries and Aircraft): U.S. Annual Procurement Cost and Estimated Dollar Cost of Soviet Procurement

A key deficiency of Soviet naval forces is their inability to detect submarines in the open ocean. While they have an extensive ASW R&D program devoted both to acoustic and non-acoustic detection sensors, the Soviets appear to lag behind the United States in acoustic detection signal processing and clearly lag behind in some aspects of quieting technology.

D. SIGNIFICANT MILITARY TECHNOLOGY DEVELOPMENTS

In Chapter I it was shown that estimates of Soviet outlays for military RDT&E have been steadily increasing and are now nearly double those of the United States. I am concerned that we sustain a general superiority in the technology base and not be surpassed by Soviet technological developments having military consequences. And we must transition technology to deployed systems faster.

Table II-4 compares the 20 basic technologies that have the greatest potential for significantly changing military capabilities in the next 10 to 20 years. This indicates that the United States has maintained its lead in most of the basic technologies critical to defense, although the Soviets are eroding the lead in about half the basic technologies where the U.S. now leads.

Table II-5 compares the technology level reflected in deployed weapon systems. This shows in aggregate, roughly the same level of deployed technology, but the high sustained Soviet production tends to erode any technology lead in deployed equipment. The number of arrows tending toward Soviet equality or superiority is a matter of grave concern.

Tables II-4 and II-5 indicate that we need to improve our exploitation of basic U.S. technology in translating it into deployed military capabilities. As part of this effort we should identify technologies that could make a major difference. This requires careful balancing of weapon capability opportunities and technological risks. At the same time technologies which could make a major difference are not the

TABLE II-4: (U) RELATIVE U.S./USSR STANDING IN THE
20 MOST IMPORTANT BASIC TECHNOLOGY AREAS*

BASIC TECHNOLOGIES	U.S. SUPERIOR	U.S.-USSR EQUAL	USSR SUPERIOR
1. Aerodynamics/Fluid Dynamics		X	
2. Automated Control	X		
3. Conventional Warhead (including Chemical Explosives)			X
4. Computer	X		
5. Directed Energy		X	
6. Electro-optical Sensor (including IR)	X →		
7. Guidance and Navigation	X →		
8. Microelectronic Materials and Integrated Circuit Manufacture	X		
9. Nuclear Warhead		X	
10. Optics	X →		
11. Power Sources (Mobile)			X
12. Production/Manufacturing	X		
13. Propulsion (Aerospace)	X →		
14. Radar Sensor	X →		
15. Signal Processing	X →		
16. Software	X		
17. Stealth (Signature Reduction Technology)	X		
18. Structural Materials (light weight, high strength)		← X	
19. Submarine Detection (including Silencing)	X →		
20. Telecommunications	X		

*1 The list in aggregate was selected with the objective of providing a valid base for comparing *overall* U.S. and USSR *basic* technology. The technologies were specifically not chosen to compare technology level in currently deployed military systems. The list is in alphabetical order.

2. The technologies selected have the potential for significantly changing the military balance in the next 10 to 20 years. The technologies are not static, they are improving or have the potential for significant improvements.

3. The arrows denote that the relative technology level is changing significantly in the direction indicated.

4. The judgments represent averages within each basic technology area.

11-18-80-13

TABLE II-5 (U) RELATIVE U.S./USSR TECHNOLOGY LEVEL IN DEPLOYED MILITARY SYSTEMS*

DEPLOYED SYSTEM	U.S. SUPERIOR	U.S.-USSR EQUAL	USSR SUPERIOR
<u>Strategic</u>			
ICBM		X	
SSBN		← X **	
SLBM	X →		
Bomber	X		
SAMs			X
Ballistic Missile Defense			X
Anti-satellite			X
Cruise Missile	X		
<u>Tactical</u>			
<u>Land Forces</u>			
SAMs (including Naval)		X	
Tanks		X	
Artillery		X	
Infantry Combat Vehicles			X
Anti-tank Guided Missiles		X	
Attack Helicopters		X	
Chemical Warfare			X
Theater Ballistic Missiles		X	
<u>Air Forces</u>			
Fighter/Attack Aircraft	X →		
Air-to-Air Missiles	X		
PGM	X →		
Air Lift	X		
<u>Naval Forces</u>			
SSNs		X	
Anti-Submarine Warfare	X →		
Sea-based Air	X		
Surface Combatants		X	
Cruise Missile		X →	
Mine Warfare			X
Amphibious Warfare	X		
<u>C³I</u>			
Communications		X	
Command and Control		X	
Electronic Countermeasure/ECCM		X	
Surveillance and Reconnaissance	X →		
Early Warning	X →		

*These are comparisons of system technology level only, and are not necessarily a measure of effectiveness. The comparisons are not dependent on scenario, tactics, quantity, training or other operational factors. Systems farther than 1 year from IOC are not considered.

**The arrows denote that the relative technology level is changing significantly in the direction indicated.

11-15-80-19

only ones worthy of aggressive support. Effective use of less exotic technology can often outperform a more advanced technology.

Three technologies appearing in Table II-4 (Items 16, 17, 18) and identified as offering dramatic opportunities at acceptable risks and arranged in order of significance are:

- o Very High Speed Integrated Circuits (VHSIC). Techniques to lay out microelectronic chips with up to 100,000 active elements would permit a hundredfold increase in signal processing speed, with greatly reduced cost per function and lowered size, weight and power. Applications are widespread.
- o Stealth. This technology includes a range of techniques for reducing the signature of a vehicle or sensor to radar IR and optical surveillance systems. These techniques include active and passive methods: radar absorbing materials and structures, advanced designs and shapes, optical absorbers, reduction of emitted signatures and active jammers and decoy transponders.
- o New Software Methods. This technology covers advanced computer software engineering techniques including software development tools, advanced higher level languages and operative environments, and speech recognition and generation automated programming.

The Soviets realize the importance of science and technology as a critical factor in the East-West competition. Lenin said "the capitalists of this whole world and their governments will supply us with the materials and technology which we need for our future victorious attacks upon our suppliers." The Soviets are believed to be currently applying Western designs and industrial technology to military aircraft. Numerically controlled Western machine tools are used in the production of newer ground support fighters, and wide-body technology could be incorporated into a follow on bomber/cruise missile carrier. The Soviets probably will apply US provided power-metallurgical manufacturing know-how to develop improved domestic tungsten-based alloys for kinetic-energy armor-piercing ammunition.

It is the "know-how" of designing and manufacturing the product, including turnkey plants and keystone testing and quality control equipment, that the Soviets especially covet. The USSR uses a variety of mechanisms available to them to acquire western technology. The degree to which these efforts enhance Soviet military capabilities has been steadily growing. By acquisition of western technology and by following proven western designs, the Soviets have reduced development risk and R&D costs. Technology transfer is very important to the Soviet Union, and the U.S. must do a better job of stopping the technology flow from West to East.

III. ACQUISITION STRATEGY

A. INTRODUCTION

Today's problems involving the acquisition process are the product of many years of turmoil and instability. Costs have increased dramatically in recent years primarily due to inflation, but also, in part, to inefficient management practices. Increased costs and budget limitations have resulted in a lengthened acquisition cycle, reduced quantities of weapons purchased, inefficient production rates, and program stretch-outs. Administrative requirements have also complicated and extended the acquisition process. Revisiting of decisions already made has contributed to the overall instability of the acquisition process. Our reliance on advanced technology, which often works to our advantage, can also restrict our options, lengthen the acquisition cycle, and impact readiness and sustainability of our weapons systems when not used properly. In the midst of these difficulties, long range planning to address requirements, opportunities, and affordability has received only lip service in past years. It is evident that one of our most vital tasks and one which has the greatest potential return, will be to reverse these trends and to establish a sound basis for the management of the acquisition process for the future.

In March, 1981, the Deputy Secretary of Defense directed a comprehensive assessment of the Defense acquisition process with the priority objectives of reducing costs, making the acquisition process more efficient, increasing the stability of programs, and de-

creasing the time taken from the inception to the deployment of our weapons systems. Representatives from each of the services, the Joint Chiefs of Staff, the Office of the Secretary of Defense, as well as private industry participated in the review. As a result of their assessment, in a decision memorandum of April 30, 1981 the Secretary of Defense and the Deputy Secretary endorsed eight major acquisition management principles and directed thirty two separate actions which comprise the DoD Acquisition Improvement Program. The management principles stated that:

- o We must improve long-range planning to enhance acquisition program stability.
- o Both OSD and the services must delegate more responsibility, authority, and accountability for programs; in particular, the service program manager should have the authority, and resources adequate to execute efficiently the program for which he is responsible.
- o We must examine alternatives which use a lower risk approach to technology than solutions at the frontier of technology.
- o We must achieve more economical rates of production.
- o We must realistically cost, budget, and fully fund in the Five Year Defense Plan and the Extended Planning Annex, procurement, logistics, and manpower for major acquisition programs.
- o Readiness and sustainability of deployed weapons are primary objectives and must be considered from the start of weapon systems programs.
- o A strong industrial base is necessary for a strong defense. The proper arms-length relationships with industry should not be interpreted by DoD or industry as adversarial.
- o DoD managers at all levels should expand their efforts to obtain maximum competition for the contractual requirements.

Although significant progress has already been made in implementing the new management initiatives, much remains to be done. I have been tasked to insure implementation, and I intend to meet our goals. In reviewing our progress, however, it is important to bear in mind that, although many of the decisions announced in the April memorandum can be implemented within DoD's legislative authority, others need to be coordinated with the Office of Management and Budget. In addition, a number of recommendations will need Congressional action before final implementation can take place. In other words, we will need time, patience, and determination if we are to succeed in improving the acquisition process.

B. STABILITY AND COST REDUCTION

According to a review of the December, 1980 Selected Acquisition Reports (SARs) for 47 major weapons systems, cost growth had reached 129 percent over the original Milestone II estimates. A major portion of the cost growth is attributable to inflation, but other factors also played an important role. For example, forty one percent of all cost growth was due to quantity and schedule changes. The instability in our programs must be corrected. As a result of the April 30 decision memorandum, a number of important initiatives are underway which will stabilize the acquisition process, and result in major cost savings in both the near and long term. These include:

1. Full Funding

We will fully fund R&D and procurement of major weapons systems at levels sufficient to ensure efficient cost, supportability, and schedule performance, while minimizing changes to the

approved program. In response to my request, the Military Departments have prepared a preliminary list of programs that will be stabilized through full funding.

2. Multi-year Contracting

Although the annual appropriation method of budgeting assures a degree of flexibility in our policies and programs, it has also been the source of great uncertainty and inefficiency. We believe that substantial savings can be gained by authorizing stable programs to proceed with multi-year contracts and thereby work to reduce costs as well as improve the industrial base.

Multi-year procurement could result in average dollar savings of roughly 10 percent in unit procurement cost through improved economies of scale and efficiencies in production processes, economy-of-scale lot buying, decreased financial borrowing costs, better utilization of industrial facilities, and a reduction in the administrative burden of placing and administering contracts. Long range planning will be enhanced because of increased stability in the acquisition process.

Progress on implementation of the multi-year procurement concept has been good. Congress has approved an amendment in the FY 1982 DoD Authorization Act (Section 909) which extends the use of multi-year contracting to major programs. The FY 1982 Authorization Act provides multi-year funding for three programs in FY 1982: the F-16, the C-2, and the Troposcatter Radio. Estimated savings for these programs is approximately \$300 million over the multi-year contract period. Additional candidates for multi-year procurement will be identified in the FY 1983 budget.

3. Improved Planning

Our improved management system provides for the Defense Resources Board (DRB) to oversee a revised planning phase of the DoD Planning, Programming, and Budgeting System. This phase is scheduled in the fall and is designed to provide a basis for the issuance of Defense Guidance in January of every year.

Two important innovations are noteworthy. First, resource planning guidance is based on mission areas in order to direct Service modernization and to establish standards for readiness, sustainability, manpower, and other logistics. Second, planning assessments are developed on a participatory basis which addresses the problems and options for planning defense resources to match the requirements of policy and strategy.

This planning process identifies alternative topline trends in DoD real Total Obligational Authority (TOA) by examining total likely resource availability, independent of needs. Further, for each mission area, region, and functional component, planning projections identify (1) projected baseline force costs and capabilities through the late 1990's, (2) major objectives, (3) key problems and deficiencies with the current plans, (4) alternative remedial programs and forces needed to bring the baseline in line with proposed guidance, and (5) possible resource savings and how they might be generated.

For future program development (FY 1984 and beyond) this process will enable the DRB and the top management of the Department to provide management direction which emphasizes program stability, better allocation of resources among competing demands, and better balance among capabilities, and among Services in cross-cutting areas.

4. Lowering Administrative Costs

The length and complexity of our acquisition process involves significant administrative costs which contribute to the overall affordability problem. Actions are needed which provide relief from burdensome paperwork, cut administrative process times and costs, and support more efficient cash flow management. Efforts are already underway to meet these objectives.

Reporting requirements are currently undergoing a thorough review. Joint working groups are examining OSD directives and Military Department regulations for areas where reductions can be made without affecting essential elements of the acquisition process. Our Financial Management Information System (FMIS) is being reviewed to simplify and reduce reporting requirements to an efficient minimum. Documentation required for DSARC milestone reviews has been reduced in length and scope.

Many thresholds which currently govern our acquisition process predate the recent years of high inflation. The result has been that much management attention is focused on issues whose "real" value is half of what it was in 1974, for example, when the threshold may have been established. Revision of such thresholds to bring them in line with current costs will alleviate a significant cause of inefficient management attention. To improve management efficiency, we have revised thresholds which define major systems and small purchases.

5. Increasing Productivity

It is an alarming fact that the United States ranks last in productivity growth of all industrialized western nations. Cash flow problems, tax policies, high interest rates, and low returns on investment have limited available investment capital. For defense industries,

low profit rates and program instability have further reduced the incentive for industry to invest in capital equipment. We are taking a number of significant steps to encourage and revitalize the productivity of our industries.

- o We strongly supported the Administration's legislative initiatives in the Economic Recovery Tax Act of 1981 which permits more rapid capital equipment depreciation.

- o We are revising the progress payments procedures used for our prime contractors, and, in turn, to their subcontractors, in order to provide an improved cash flow environment conducive to greater investment and improved productivity.

- o We are emphasizing the Manufacturing Technology Program in order to increase productivity in defense industries over the long term.

6. Realistic Budgeting

A major factor which has contributed to the rising costs of our weapons systems has been the inaccuracy of estimates of costs and inflation. Low initial cost estimates based on optimistic assessments of future inflation rates and "buying-in" have in too many cases resulted in the cost overruns which receive so much public attention. We are moving forward on two tracks to meet this problem.

One solution being implemented requires the services to budget to the most likely cost of a program including predictable cost increases due to technical risk. Independent cost estimates provided by the Cost Analysis Improvement Group (CAIG) and a contract cost monitoring plan have been identified as essential elements toward more realistic budgeting. An overall plan which will incorporate these elements is being developed and initial guidance on realistic budgeting is being provided to the Services by the Comptroller.

A second, related, initiative concerns our intent to budget to cover inflation. In many cases, inflation experienced by DoD programs has been higher than that directed by OMB guidelines. Discussions are being held with OMB in hopes of finding a means to provide a basis for more realistic cost projections based on appropriate inflation rates.

7. Increasing Competition

Achieving cost effective competition is one of our major acquisition improvement initiatives. We have taken a fresh look at competition in all of our major weapon systems. Out of a total of 48 major systems, we find that 42 had initial competition in the program where the contractor was picked through a competitive source selection process. In 24 of the Selected Acquisition Report (SAR) systems we actually contracted with two or more competitors for some or all aspects of the development program. In some of these systems like the F-16, A-10, AAH, and M1, we have built competitive hardware for evaluation before entering full scale development. In others, such as the Multiple Launch Rocket System, DIVAD Gun, and Cruise Missile, we carried the competition through the entire development program. Even when we eventually get to a single development prime contractor, significant competition still takes place at the subsystem and vendor levels for the majority of the effort. We are pursuing several systems with production competition at the prime and subcontractor level and plan to add more in the near future. We now examine the acquisition strategies of all major programs for the benefits of competition in production as well as spare parts. We have intensified our scrutiny of the broader economies from competition in the production phase and plan to continue this emphasis in the future.

8. Acquisition and Distribution of Commercial Products (ADCoP)

Another of our initiatives to improve the cost-effectiveness of the acquisition process, reduce technological and logistical risks, and shorten procurement lead time is to acquire off-the-shelf products and use commercial practices that meet defense requirements. During 1981, we developed and coordinated a revised ADCoP Directive (DoDD 5000.37) and companion implementation manual (DoD 5000.37.M). Special Defense Acquisition Regulation (DAR) provisions are being prepared to simplify the procurement of acceptable commercial material. We are reexamining our specifications and standards policies and procedures to optimize the use of acceptable, nationally recognized, voluntary (non-government) standards, Commercial Item descriptions, and simplified specifications.

9. Use of Common Equipment Across Systems

The use of common equipment items across major weapons systems within each Service or across Services can lower the cost of administration and support and can contribute to a reduction in acquisition time and improved readiness. The Military Departments have been requested to identify new development programs for subsystem and support equipment which satisfy common generic equipment requirements. Acquisition of peculiar, rather than common, equipment, for a major program will require justification.

10. Embedded Computer Support

Our best estimates are that the investment in "mission systems" computer resources, software and hardware, will grow from approximately \$6 billion in 1981 to nearly \$38 billion in 1990. Much

of this rapid growth appears to be the result of a lack of standardization or reusability, and of adequate and modern development facilities. I intend to take action to address these problems, through completion of the common DoD programming language (Ada) Program and insistence upon proper use of high order language for software preparation. I have tasked the Defense Science Board to evaluate our initiatives to standardize on a few government owned architectures for our militarized computer needs. We are also evaluating our organization at the OSD level to see if it is adequately matched to our needs.

C. REDUCING ACQUISITION TIME

Recent studies have shown significant growth in the time taken for a system to proceed from the drawing boards to the field. For some types of systems, time taken up by the acquisition process has almost doubled since the 1950's. Obviously, many of the budgetary issues and problems described above have impacted heavily on weapons systems' schedule performance. Nevertheless, there are actions aside from our cost reduction-oriented initiatives which can assist in reducing acquisition time.

1. Preplanned Product Improvement

A major factor which has contributed to the increased time required to field new weapons has been our preference, sometimes of necessity, for advanced technology systems. This approach has carried with it significant technical risks which, when not controlled, have resulted in increased time taken for development and increased cost. While we should not abandon the advantages we have won through high technology programs, future decisions on new programs should consider a

more evolutionary approach. I believe that this approach will allow us to field more systems sooner at lower cost while we continue to develop higher performance alternatives.

Our Preplanned Product Improvement (P³I) Program consciously inserts advanced technology into a program through a series of planned upgrades of subsystems. Military Departments have identified about forty programs with potential for P³I application.

2. Front-End Funding

Time can also be saved in the acquisition process by emphasizing quality, reliability, and testing from the very beginning, and ensuring that adequate attention and funding are provided for these efforts. To achieve this objective, greater funding and incentives to industry are needed. Guidance has been provided to the services to develop acquisition strategies which emphasize these factors. I have specifically directed the Services to provide greater front end funding for test hardware. Additional emphasis must also be placed on software development, verification, and validation.

3. Funding Flexibility

Another procedure which has the potential to save many months -- possibly years -- is the use of procurement funds to fund urgent development work. Authority for such transfers is currently being sought from Congress.

D. IMPROVING SUPPORT AND READINESS

Improvement in readiness and sustainability is one of our primary objectives. Design objectives must be established early which will result in achieving needed readiness without expensive retrofits

or exorbitant logistic and maintenance manpower needs. To achieve this, front end funding must be adequate to ensure reliability and maintainability goals can be met and related deficiencies corrected. Industry must be directly involved in this new emphasis. We intend to deliver weapons to the field with these objectives in mind.

1. Contractor Incentives

Participation of industry is a critical element in improving our readiness and support. Incentives are needed for industry to devote its design talent toward improving system reliability and maintainability (R&M), reducing the support tail, and reducing needs for scarce Service maintenance technicians. Direction has been issued to the Services to increase their emphasis in this regard both in contractor source selection and in award. Acquisition strategies are to provide incentives to contractors to meet our readiness and support goals as well as to reduce unit costs.

2. Standard Operating and Support Systems

An additional approach to improving readiness and support will result from putting more support related technology on the shelf through increases in the use of standard operating and support systems and through logistic R&D.

3. Manpower, Personnel and Training Impact on Design

The design effort on our new systems must focus more attention on the people who will operate and maintain the systems. We are currently developing methods of assessing the manpower, personnel, and training (MPT) impact on readiness, methods for influencing the design of systems to reflect MPT needs, and a better integration of the manage-

ment of MPT during the development process. A first step is a major new focus on manpower requirements in the new draft MilStd 1388 on Logistic Support Analysis.

4. Readiness Goals

The Deputy Secretary of Defense has directed the Military Departments to identify readiness goals for each acquisition program early in R&D and to make these primary program management tools. At each decision point, problems and progress toward achieving support goals will be assessed. R&D and other resource shortfalls will be addressed.

5. Front End Funding for Test Hardware

A prevalent problem has been insufficient development test hardware at both the system and subsystem level to allow parallel testing and development for performance and R&M. Thus, when schedules are tight, R&M has suffered. On each program this will be specifically addressed early.

6. Weapon Support Funding

Fielding a system with adequate readiness requires that funds be planned for all the support elements to include spares, manuals, test equipment, training devices, facilities. We are trying new approaches to getting management visibility and planning responsibility to ascertain that the needed resources for initial fielding are included in the PPBS process as well as follow-up.

E. IMPROVING THE DSARC PROCESS

It is generally agreed that we should streamline the Defense Systems Acquisition Review Council (DSARC) milestone review process, and,

in particular, to reduce administrative requirements. We also recognize that the principle of decentralized management requires judicious involvement by OSD in the acquisition process. Consequently, the acquisition process assessment was intended from the outset to determine more efficient and effective methods to apply to the DSARC process. We have made major progress toward the achievement of this goal.

1. Raising the Threshold for Major System Definition

By raising the thresholds for major systems to \$200 million for R&D and \$1 billion for procurement, the number of weapons systems subject to a required DSARC review process has been reduced by 20%. We can, of course, elect to review other systems, if needed.

2. Reduction of DSARC Milestones

The number of required DSARC decisions has been reduced from four to two. The first is designed to review development concept selection including examination of threat, weapons concept, acquisition strategy, risk and schedule, the program plan for test and evaluation, readiness, and affordability goals. The second decision point -- Program Go-Ahead -- is used to review the service proposed action and program plan including full scale development and production quantities and costs, the program plan for additional test and evaluation, support and readiness, and the total acquisition strategy, including design and price competition. If the program does not significantly deviate from the approved plan, no further approval by the Secretary of Defense is needed in the absence of major external changes.

3. Integrating the DSARC and the Budget Process

A major characteristic of the instability we have experienced in the acquisition of our weapons systems is the inconsistency between program decisions arrived at within the DSARC process and budget decisions determined during the annual budget review. We recognize the importance of this problem and have resolved to integrate more fully the DSARC and Planning Programming Budgeting System (PPBS). The Service must provide assurances, during the DSARC review process, that adequate resources are included in the Five Year Defense Plan (FYDP) or that the required resources can be reprogrammed to execute the program as recommended.

As an additional means to integrate the DSARC and PPBS, new start programs, instead of being considered through separate coordination of a Mission Element Need Statement, are to be fully integrated into the Service Program Objective Memoranda (POM) and considered during the POM review process. This provides a means for reviewing, at the highest levels, all new start programs to ensure each is justified and that we don't waste resources by starting more programs than we can afford.

F. SUMMARY

One of my primary objectives-- one which has the greatest potential for a lasting contribution to our national security-- has been to improve the acquisition process. Over the years, I have heard many discussions about how to improve the system, and I have seen a number of well-intentioned attempts to implement meaningful reform. Our review of the Defense acquisition system, however, has indicated that such

efforts have not progressed very far. The seriousness of the Soviet threat does not allow us the luxury of delay any longer.

The Department of Defense Acquisition Improvement Program has been underway less than a year, during which time we have made near term progress and have laid the foundation for future success. The improvements which we are implementing focus on reducing costs, acquisition time, and the administrative burden while improving the overall efficiency and the effectiveness of the management process. Our efforts will result in more weapons, deployed sooner, which are more easily maintained and supported at less cost to the taxpayer.

It is important to recognize, however, that we cannot be fully successful in meeting these goals without Congressional support. We are aggressively pursuing the cooperation of Congress on legislative matters of concern. I am confident that with your support and our determination to get the job done, we can finally solve the problems of acquisition which challenge us.

IV. INDUSTRIAL RESPONSIVENESS

A. INTRODUCTION

The proclamation by the President to revitalize the U.S. economy and strengthen our national defense has surfaced for public scrutiny the serious decline in our overall economic base and our leadership in the industrialized world and breathed new life into a vital element of our national security. This vital element is our industrial base, and the historic dependence we have placed on it in projecting our national strength. There is a consensus on the need for aggressive programs to restore the health of the American economy and to ensure that our military strength is adequate for the 1980's.

The decline of our industrial base is one of our concerns. The Congress documented its concerns last year in a special report entitled, "The Ailing Defense Industrial Base: Unready for Crisis" prepared by the House Committee on Armed Services. As part of numerous findings, it concluded that "the defense industrial base has deteriorated and is in danger of further deterioration." The problems we have found in the defense industry are in fact a sub-set of our overall economic industrial problems. The Defense Department's approach to the problem of the defense industrial base, therefore, is consistent with the President's overall program to revitalize our economy and strengthen our national defense. Our concerns are that:

- o We are becoming increasingly dependent on imports for too many scarce natural resources, many of which are vital for defense like cobalt. Some of our laws

restrict us from even sampling or exploring to determine if sources are available on U.S. public lands.

- o Our vital strategic and critical material stockpiles are out of balance--some materials are excess to requirements and several are below inventory goals.
- o Our procurement history for major systems reflects increasing lead times and rising costs.
- o Productivity in defense-supporting industries is too low. The U.S. ranks last in the rate of increase in productivity behind other major industrialized nations.
- o Compared to other business, defense contracting is viewed by business as less stable, less predictable, and thus less attractive than commercial business.
- o There are potential shortages of some types of engineers, technicians, and skilled blue collar workers.
- o Defense industry has limited surge or rapid mobilization capability below the prime level.

B. PROGRAM DESCRIPTION AND STATUS

In response to these problems we have developed a Department of Defense Action Plan for Improvement of Industrial Responsiveness. This Action Plan is structured to identify the problems, define our objectives and set forth our ongoing and planned actions in three major areas. The first is our National Resource Base. Our objectives are to:

- o Overcome near term materials shortages and lead time problems;
- o Work toward self-sufficiency in critical raw materials;
- o Obtain sufficient skilled labor to meet the needs of industry;
- o Improve industrial productivity.

The second is the Defense Acquisition Process (discussed in detail in Chapter III). Our objectives are to:

- o Reduce acquisition cost;
- o Reduce acquisition time;
- o Increase program stability; and
- o Ensure coordination of acquisition systems decisions with PPBS decisions.

The third is Industrial Preparedness. Our objectives are to:

- o Develop and implement consistent Defense Guidance;
- o Allocate required funding for guidance implementation;
- o Create an organizational and legislative environment conducive to industrial preparedness planning and mobilization; and
- o Maintain a defense industrial base which is responsive to mobilization needs.

The following discussion summarizes a few of the specific steps we are taking and some of the tools available to accomplish these objectives:

The Acquisition Process

- o On 30 April 1981 we concluded an acquisition process study and are now aggressively implementing 32 recommendations and decisions for improvement of the acquisition process. This is referred to as the "DoD Acquisition Improvement Program."
- o The status and description of efforts is contained in Chapter III.

1. The Defense Production Act

The Defense Production Act provides the prime authority for vital programs directed toward maintaining the national defense industrial base for peacetime, surge and national emergency requirements. Over the past 30 years, we have relied heavily on the Defense Production Act to maintain ongoing defense contracting and preparedness programs to support our national security objectives. With the Title I authorities provided to us, we have reduced the impact on defense program schedules which can be experienced during periodic fluctuations of the business cycle and material shortage situations. The objective is to maintain weapon system delivery schedules thus preventing unacceptable delays.

2. National Defense Stockpile

The purpose of the stockpile which is managed by the Federal Emergency Management Administration is to ensure that our Government will have available the necessary raw materials to support military requirements and the basic civilian economy during periods of extended conflict.

a. Critical Raw Material Status

Under the National Strategic and Critical Materials Policy, R&D Act of 1980 (P.L. 96-479), we are assessing our raw materials situation and we are preparing a list of technical, administrative, and legislative options to promote the national security in this important area. On 13 March 1981 the President approved the first National Defense Stockpile purchase program in more than 20 years, beginning with \$100 million of purchases (Seventy million dollars for cobalt). At the

same time, the President indicated that larger purchases would be made in the future as revenues from sales of excess materials accumulate in the stockpile fund.

b. Foreign Dependence

Although we are dependent upon foreign sources for many raw materials, we are also experiencing a significant decrease in domestic capabilities to process and manufacture industrial products. We are exploring methods of restoring a domestic industrial capability in critical areas of foreign dependence.

3. Manufacturing Technology Program

The Manufacturing Technology Program is a broad based program designed to improve the productivity and responsiveness of the Defense production base. Investments made by this predominately procurement funded program are expected to result in factory floor applications of productivity enhancing technology. Recent accomplishments include:

- o Establishment of a new process for assembling and testing solid state radar power modules which reduce power module manufacturing costs by 50 percent. This is expected to save over \$20 million based on planned purchases.
- o Application of computer graphics and computer controlled punch presses to manufacturing ship's sheet metal heating and ventilating components improved productivity (reduced man hours by 40 percent) and reduced production costs (\$2 million projected savings for nine ships).
- o Established a large area, thin walled aluminum casting process which is being used on the Air Launched Cruise Missile. This is expected to save \$150 million on a buy of 3,400 missiles.
- o Establishment of a micro-computer monitor and control system for wave soldering printed wiring board.

This has resulted in an estimated savings to exceed \$1 million per year in the contractor's facility alone.

- o Establishment of a computer controlled, modular, automatic test station for gas operated control actuators for guided artillery projectiles. This reduced test and inspection time by 87 percent.

4. Industrial Base Technology Modernization:

The Technology Modernization (or Tech Mod) Program is a joint venture with industry wherein we invest in enabling manufacturing technologies and industry invests in capitalization for modernization of a factory, plant, facility, assembly line, etc. The approach involves a formal structured analysis of the manufacturing operation to be modernized followed by contractual agreements as to who will do what and the benefits sharing to result. The Tech Mod contract is linked to one or more acquisition contracts, providing the leverage, shared benefits, and contractor risk protection. The end result benefits all; industry is modernized through technology and capitalization, the government saves money on acquisition, industrial capacity/capability is increased, and industry reaps additional profits. Only one example is mature enough to evaluate. The technology modernization of the F-16 production line has been a notable success, paving the way for future joint ventures of this kind.

5. Industrial Base Guidance and Funding

A key part of our overall effort has involved the development of new defense guidance and funding support. The focus of guidance is on lead time reduction and productivity enhancing initiatives by:

- o Isolating the key bottlenecks and constraints that are causing long procurement lead times;
- o Identifying what private and government resources must be applied to reduce and/or eliminate bottlenecks; and
- o Examining various industrial preparedness funding alternatives for prioritizing the allocation of resources.

The Services are taking steps to improve all areas of the Industrial Preparedness (IP) Program. A comparison of the current Five Year Program with the previous Five Year Budget Program, reveals a 43 percent increase. Highlights of the new IP Program include:

- o \$309 million for 105/120mm tank ammunition facilities;
- o Approximately \$200 million to modernize the Army's Rock Island Arsenal which is used to produce artillery weapons, and tank gun components;
- o Approximately \$75 million to complete the modernization of our only large caliber cannon manufacturing facility--Watervliet Arsenal;
- o Sufficient funds to maintain 19 Air Force industrial plants containing over one million items of plant equipment;
- o A significant increase in the Air Force's manufacturing technology program which will support machinings, electronics, powder metallurgy, composites, materials processing, and integrated computer-aided manufacturing efforts; and
- o Doubling the Army's Five Year Manufacturing Technology Program.

6. Government/Industry Relations

An explicit part of our overall approach for revitalizing our industrial base is to work and coordinate our efforts more closely

with industry. We have no chance of improving the acquisition system without working the problem side-by-side. That is why we have placed improved relations between the Defense Department and its contractors high on our list. In this regard, we are scheduling meetings with industry officials as well as state and local governments. This is to insure understanding of the need for revitalizing our industry by explaining what DoD is doing to achieve this goal by obtaining industry reaction to DoD efforts and by soliciting industry assistance.

In August the Deputy Secretary of Defense hosted a special meeting with the Conference of Mayors. This meeting was useful in establishing a communication link with the cities as part of this Administration's effort to revitalize American industry. To assist us in communicating potential Defense requirements to industry, we have developed a Defense Economic Impact Modeling System to provide analyses to industry for use in planning to meet requirements of Defense Acquisition programs.

C. CONCLUSIONS

During the past year there has been a substantial change in philosophy and policy with respect to acquisition of Defense items. The burden now is to assure that these changes are implemented to the fullest extent. We are seriously concerned about the Defense industry especially with respect to the fundamental strength of the Defense industrial base--its productivity, the quality and reliability of the products, lead time, diminishing manufacturing sources, and industry's ability to respond to normal demands as well as meet surge and protracted emergency requirements. We feel with the initiatives being

pursued and the progress made so far, that U.S. industry does have the capability to absorb the planned increases in defense spending over the next few years provided we continue to pay close attention to the areas which have adversely affected production. We believe that the time phasing of our major programs is such that with prudent attention by both government and industry we will succeed.

V. INTERNATIONAL ACTIVITIES

A. INTRODUCTION

Our goal is to expand the scope and effectiveness of our international activities in a manner that advances our national interests and enhances the security of the United States, our friends and allies. Our strategy is to improve the planning and resource management processes within the Department and to exploit the talent and experience of industry by encouraging the direct involvement of the private sector in international defense cooperation.

B. DIRECTIONS AND METHODS OF INTERNATIONAL ARMS COOPERATION

I believe that the best counter to the global challenge of the Soviet Union lies in the collective exploitation of the technological capability and the industrial strength of the United States and the Free World. To achieve this, more effective arms cooperation between the United States and our friends and allies is imperative. The role of industry is key to the success of cooperative efforts. I have initiated actions to increase the participation of private industry in the review of current defense policy in the area of coproduction, offsets and the mobilization base. I am also working to reduce obstacles, both foreign and domestic, to direct industry-to-industry agreements and to provide incentives such as placing selected cooperative programs on a Stable Program List. For R&D projects which appear to offer good opportunities for arms cooperation we are considering introducing a policy which would establish NATO industrial participation in the Request for Proposal as a primary source selection factor to be considered in their evaluation.

Our activities are channeled to address both short and long range objectives. Cooperative development programs are to be geared to satisfying long-range planning requirements and standardization goals, while near-term needs are to be satisfied through military trade and coproduction efforts. Activities promoting interoperability, which provide the greatest return in the shortest time, are being vigorously pursued.

1. NATO/Europe

The NATO Conference of National Armaments Directors (CNAD) fosters flexible NATO-wide cooperation in research, development, production and procurement of defense equipment. Issues brought before the CNAD receive the direct attention of the highest national armaments authorities. In this forum in October 1981, I strongly endorsed and the CNAD approved the full implementation of the Periodic Armaments Planning System (PAPS) as the NATO-wide mechanism for rationalizing arms development to meet the mission needs of the Alliance. The PAPS framework closely parallels our DSARC process, and we will work within it to harmonize U.S. and NATO military equipment requirements starting at the very beginning of the acquisition process.

To provide more near-term results, I am also emphasizing coproduction of existing equipment and early agreement on codevelopment as a rapid means of improving Alliance capabilities and promoting standardization. The Independent European Program Group (IEPG) -- the NATO-European countries except Iceland and Luxembourg -- recently submitted a list of candidate European designed systems for coproduction consideration by Canada and the U.S. Should the European systems meet U.S. re-

quirements and satisfy reasonable cost effectiveness criteria they would save development resources and promote weapon standardization. This IEPG initiative represents a follow-up to our proposal of 17 U.S. designed systems to the IEPG in 1979. Four of the 17 systems are in or nearing actual production in Europe.

The NATO Long Term Defense Program (LTDP) continues to represent a valuable planning mechanism for establishing and monitoring critical areas for Alliance improvements. I strongly support the LTDP efforts and have endorsed a proposal for a general review of the LTDP process with a view toward future improvements. Our goal within NATO, as elsewhere, is to refine and improve the structures which promote efficiency, effectiveness, and mutual interests.

Our efforts in non-NATO Europe, with neutral and non-aligned nations, are characterized by the pursuit of common interests. When mutually beneficial, we will support the transfer of technology and the sale of equipment to countries whose policies advance interests in consonance with our own.

2. Middle East/Far East/Southern Hemisphere

In contrast with the structured military organizations and practices of the North Atlantic Alliance, our arrangements with the friendly nations of these other areas are conducted largely on a bilateral basis. Our objectives are to further mutual security interests, to exert U.S. influence, to stretch the resources available to us and to them, and to develop their self-sufficiency insofar as practical. I recognize that, with the exception of Japan, Republic of Korea and Israel, these nations do not have industrial capabilities comparable to those of our

major North Atlantic Allies. Thus a primary goal in our cooperation is the enhancement of their defense industries through technical assistance, prudent technology release and regular consultation. Japan and Israel have the possibility for joint or complementary research and development and our efforts with them seek this additional goal. Saudi Arabia is a major arms sales customer, and thus while we have no co-production or joint development activities with them, we actively work to ensure compatibility of their equipments with ours and with those of other friendly nations in the area.

Our current cooperative activities with Israel are based upon a 1979 Memorandum of Agreement which facilitates activities in research, development and procurement. Our R&D activities include test and evaluation of each other's equipment, funding of R&D in the other country, competitive R&D and joint projects. Procurement activities are similar to those of the NATO reciprocal purchasing Memorandums of Understanding except that the principles are applied less broadly. To date Israel and the DoD have agreed to open competition on over 500 items.

Our cooperation with Egypt, also based upon a Memorandum of Understanding, is based on programs to provide their defense industries new capabilities to support their force needs, and is quite similar in nature to what we have with our NATO ally Turkey.

We cooperate with the Republic of Korea in a program to develop their defense industrial base similar to the programs with Egypt and Turkey, except that the Korean program has been under way for almost a decade, with much success.

Japan, Australia and New Zealand are treated for sales similarly to the nations of the North Atlantic Alliance. We believe common equipments--standardization and interoperability--to be equally important with these nations as with those of the North Atlantic Alliance. Our cooperative activities with Australia and New Zealand concentrate on exchange and selected projects for joint sponsorship. Japan purchases some U.S. equipment, but gives emphasis to indigenous designs or the production of U.S. equipment in Japan.

U.S. export policy toward the People's Republic of China (PRC) has been liberalized by the President. The U.S. is now willing to consider on a case-by-case basis the transfer of items on the munitions list. For dual-use items, evidence that the end user is engaged in military activities will no longer necessarily result in a sales denial. PRC procurement is on a commercial basis and not through the Foreign Military Sales Program.

Within our own hemisphere, two countries bear consideration, Brazil and Argentina. Brazil is now capable of producing most types of ground force systems and is the Free World's third largest exporter of armored vehicles. It also ranks sixth among Free World aircraft producers. Argentina's arms industry is second only to Brazil in Latin America and Argentina is preparing to aggressively enter the export market with light weapons, armored vehicles, and aircraft. Under license, Argentina is currently developing and using modular construction techniques for corvette/frigate sized naval vessels. Both Argentinian and Brazil have the possibility for productive armaments cooperation with us.

3. International Defense Agreements and Trade Policy

Two major actions have been initiated which will establish a closer and more effective relationship between our international defense cooperation efforts and U.S. industry. There has been a trend among our industrialized allies to request offset agreements as an element of their arms selection decisions. To ensure that our international programs are based on consistent and equitable policies and that these policies reflect DoD and national interests, the Under Secretary of Defense for Policy and I created a task group to study DoD policy toward international coproduction, industrial participation and offset agreements. In a separate but related effort, the Secretary of Defense and the U.S. Special Trade Representative have jointly chartered an industry Defense Policy Advisory Committee (DPAC) for trade policy matters to provide policy advice to the Deputy U.S. Trade Representative and me.

The task group on coproduction/industrial participation agreements consisted of high-level representatives from the military departments and the various offices of the Office of the Secretary of Defense. This group reviewed the full policy and national security ramifications of foreign industrial participation on sales of major defense equipment of our allies, including our policies toward offset agreements. It studied the economic and security interests of both the U.S. and partner countries and reviewed the impact of such agreements on our mobilization base. After developing policy recommendations and criteria for evaluating proposed future collaborative efforts, the group obtained the views and recommendations of the U.S. defense industry and appropriate government agencies. The results of the study were recently

briefed to the Under Secretary for Policy and me and are being considered for implementation. I will report separately to the Congress on actions to be taken.

The Defense Policy Advisory Committee will be composed of thirty chief executive officers representing a cross-section of U.S. defense industry. At least ten of the members must be in the supplier or vendor business. This committee will provide valuable general defense policy advice from the private sector. It will consult with and make recommendations to me and to the Deputy U.S. Trade Representative on defense trade policy and domestic industrial base issues.

These two activities will provide an important and needed coherence to the formulation of international arms cooperation policy. Moreover, the active involvement of the private sector will make a major contribution to the establishment of balanced and realistic defense cooperation agreements which enhance the security of the U.S., our friends and allies.

C. TECHNOLOGY TRANSFER

Arms transfers and technology sharing play an increasingly vital role in international relations and the U.S. has major security interests in such transfers. Military and military related technologies are a vital national resource to be controlled and shared in a manner that advances U.S. security interests. I support the selective transfer of advanced military technology to allies and friends in the context of cooperative defense efforts and security assistance when mutual benefits are derived. I will ensure that the transfer of technology to potential

adversaries is strictly controlled. In my judgment we have to do a better job than has been done in the past of preventing the Soviets from benefiting from U.S. technology. We will help friends and allies through prudent and judicious transfer and sale of military equipment, thereby contributing to their security and enhancing our own by improving our production efficiency and strengthening our industrial base. To further the formulation of a national policy for technology transfer, the DoD plans to circulate for interagency coordination a revised version of the Interim DoD Policy Statement on Export Control of United States Technology.

While endeavoring to assist friends and allies through the export of U.S. equipment and technology, we are also aware that many of these friendly nations possess highly developed industries and sophisticated technologies which can provide reciprocal benefits to this country. For this reason, we have instituted a policy of encouraging U.S. defense contractors to seek reciprocal technology transfers when entering into data exchange and other agreements with foreign industries.

I am placing greater emphasis on the establishment of appropriate safeguards and control mechanisms for all technology transfer activities. We will do this by dedicating more resources to the review of military technology transfers from a multi-disciplinary counterintelligence perspective.

Other technology transfer and export control efforts have stressed the establishment of a better structural mechanism which will improve the DoD management process and ensure efficient achievement of policy objectives. We are staffing a DoD directive to increase OSD direction and control over all DoD component activities in the fields of

technology transfer and export control. It will combine separate existing directives concerning munition and commercial export case evaluation to provide greater consistency in the review process. My initiative to create a discrete budgetary program element within OSD for export control activities represents another key measure for increasing management effectiveness. This program element will provide dedicated funds and establish accountability for Congressionally mandated export control responsibilities.

Further management improvement has been achieved through the completed revision and update of the Militarily Critical Technologies List (MCTL). The MCTL now represents a valuable source document which provides a sound technical basis for the development of transfer policy and the review of control lists and dual-use export cases. We are hoping to publish an unclassified version of the MCTL to initiate a broad and open dialogue with industry to elicit their cooperation in this vital area. The revised MCTL will also be used as the basis for a formalized review of the Coordinating Committee (COCOM) list for control of production and technology exports to the Warsaw Pact. The MCTL and supporting documentation will support and strengthen US efforts in multilateral negotiations to achieve more coherent COCOM controls on exports to the Warsaw Pact.

Progress in the area of strategic trade has been effected by improving the timeliness and quality of license application review and the elimination of major case backlog. This has been accomplished by increasing staff resources, creation of a computer data base for cases, and the implementation of new procedures and delegations of authority to

the Department of Commerce. We have also improved the staff-level dialogue between the Departments of State, Commerce, and Defense.

D. FOREIGN WEAPONS EVALUATION (FWE)

The FWE program plays a major role in enhancing interoperability and standardization between U.S. forces and those of our allies. The program also promotes technology exchange and competition, thereby reducing unnecessary costs and duplication in weapons acquisition programs. Our efforts under the FWE program are described in Chapter XI.

VI. SCIENCE AND TECHNOLOGY

A. INTRODUCTION

The Science and Technology (S&T) Program is the means by which the DoD provides technical options for the solution of mid- to long-term national security problems. It consists of about 18% of the Department of Defense Research, Development, Test and Evaluation budget. The S&T program is made up of the Research (6.1) Program, the Exploratory Development (6.2) Program and Advanced Technology Development (6.3A) Program. The projects undertaken range from basic scientific investigations by which new phenomenology is discovered to large scale demonstrations in a military environment of promising technologies that will subsequently be the building blocks for new systems. The S&T cycle provides the know-how required to ensure a viable means of acquiring technologically advanced weapons upon which our strategy for countering the numerical superiority of our adversaries depends and it also precludes adverse technological surprise.

The Army, Navy, Air Force, the Defense Advanced Research Projects Agency (DARPA), the Defense Nuclear Agency (DNA) and the Uniform Services University of Health Sciences (USUHS) participate in the S&T Program. Actual work performance is somewhat broader. The university community, industry and DoD in-house laboratories are all partners in the performance of this vital R&D for the country. We not only rely on DoD's technology programs but also depend upon the efforts of other government agencies, the industrial community and our allies for the technology knowhow we need. It is the combined

efforts of this diverse group that provided this nation with the military technology lead we now have over our adversaries and it is upon their continuing efforts that our future technology lead depends.

B. MANAGEMENT ACTIONS

My long association with commercial and government high technology organizations has made me keenly aware of the need to have both a viable technology base and also a means to insert rapidly the technology evolved into useful products for the forces. As indicated earlier, I have proposed a new position, the Assistant Secretary of Defense for Research and Engineering (Research and Technology), which will be one of the top two positions in OUSDRE. This new Assistant Secretary will also serve as the Director of DARPA. Among the gains to be realized by this arrangement are a better basis for R&D planning, improved coordination between the Services and Defense Agencies and earlier insertion of successful technology demonstrations into new systems. The latter, I consider to be extremely important because if we do not select and use promising technologies, much of the potential benefit can be dissipated by either inaction or delays.

Another action I initiated was to task the Defense Science Board (DSB) to undertake a review of the Technology Base during the 1981 DSB summer study. I was fortunate to secure Dr. George H. Heilmeier, Vice President of Research, Development and Engineering for Texas Instruments, to lead this study. He was supported by a distinguished group of personnel from the government, industry and university communities. Specifically, I requested the DSB to look at

technologies that offer an "order of magnitude" improvement in needed military capabilities, the level of technology base investment and our investment strategy. In addition, they were asked to examine the technology to application process, university-DoD relationships and adequacy of scientific and engineering personnel resources. Specific recommendations were made by the study panel in the following critical areas:

- o Improvements in the linkage between Technology Base investment strategies and the requirements for future combat.
- o The selection of potentially high payoff technologies for increased emphasis in the DoD Technology Base Program.
- o Increased funding for technology demonstrations (Advanced Technology Developments) which are an essential part of efficient technology transfer.
- o Enhancement of the university research base relating to defense preparedness in the areas of quality of faculty, equipment, facilities and support.
- o Exploitation of opportunities to increase the effectiveness of the DoD laboratories and DARPA.

In summary, the DSB report focuses attention on one of the nation's most important assets, its technology base. We are giving priority attention to the implementation of these recommendations.

C. THE TECHNICAL PROGRAM

In the future we intend to look at long-term technology needs based on a scenario which envisions that future conflicts will take place under very fluid battlefield conditions. This assumption postulates that improved weapons (tanks, aircraft, ships, etc.) will not be basically different from those of today but that major concentrations of troops and equipment may not be practical. Therefore,

new tradeoffs between mobility, agility and firepower become very essential. Small unit actions, finding the enemy, integrating C³I/nuclear/chemical/electronic warfare and dispersed forces become the battlefield problems of the future. Among the specific technologies that become important are those that will permit us to conduct sustained operations, to locate and track hostile forces continuously, to provide real time information management, to counter hostile acquisition systems, to provide "transparent" technical complexity, to ensure high equipment availability as well as reliability and to provide those equipments that can operate in extreme environments (chemical/nuclear/weather). In evaluating the opportunity-to-technology risk ratio as a criterion, we have arrived at a group of technologies that could, in our view, "make a difference."

We of course will be continuing our emphasis on current thrusts in directed energy and directed energy countermeasures, very high speed integrated circuits (VHSIC), adverse weather precision guided munitions, advanced materials and chemical warfare. However, we believe that stronger effort is required on selecting additional technologies for management and funding emphasis. Among the disciplines we plan to review and consider for future emphasis are:

- o Microelectronics (with emphasis on VHSIC), fail safe/fault tolerant electronics, and hardening against all types of radiation;
- o Advanced software/algorithms, machine intelligence, supercomputers, optical processing and communications and microprocessor-based personal learning aids;
- o Rapid solidification technology, advanced composites, and large space structures;

- o Active and passive stealth for aircraft and structures, space nuclear power, space based radar, infrared arrays, high power microwaves and short wavelength lasers.

I have considered the problem of transitioning new technology into its use in deployed systems and have concluded that there is insufficient interaction between the ultimate user and the technologist. I believe it is clear that definition of requirements, user acceptance, user participation in the selection of technologies, evidence that technology is "ready" and a clear need for the technology are factors significantly affecting the successful transition of technology. These guidelines are particularly appropriate for the Advanced Technology Developments where demonstrations are carried out to prove feasibility and gain experience in the application of new technologies. The proposed new Assistant Secretary will be giving particular attention to these demonstrations.

D. UNIVERSITIES AND LABORATORIES

The DoD depends on the university community to provide scientific and technical personnel to DoD, to do basic and applied research and to provide expert consultants and independent advice. I share the belief of the Congress that the nation is facing a crisis in supplying technical personnel to maintain the military and economic security of the country. I plan to continue increases in basic research support to universities, to effect improvements in procurement policies and regulations, to reach an accommodation with universities on improvements in export control procedures, and to upgrade selected

equipment in the universities where it will add to their capability for research in the high leverage technologies needed by DoD. The crisis facing our educational institutions requires action broader than just that which can be taken by the DoD, and I intend to support interagency activities working on this problem.

I intend to strengthen university-industry interaction in order to speed the transfer of technology from basic research into production of weapon systems. The independent research and development (IR&D) program in industry can be the vehicle for accomplishing this purpose by encouraging IR&D work to be contracted out to universities. We are now looking into this matter as a management tool to strengthen research within IR&D, to foster closer cooperation between academia and industry, and to speed transitioning technology out of basic research.

The DoD in-house laboratories play a valuable role in the management of the acquisition program. They provide us a cadre of people with state-of-the-art knowledge who do not have commercial allegiances and can respond quickly to DoD needs. Their use is particularly necessary in areas where limited non-DoD expertise (chemical warfare, ordnance disposal, etc.) exists. It is highly desirable to do a part of the experimentation, testing and evaluation in-house and to use the expertise developed to determine the direction technology should take. And finally, we need smart technical buyers and a corporate memory of past successful technical, fiscal and procurement approaches to our R&D problems. Our own Laboratory

Management Task Force and the DSB study have made recommendations concerning personnel practices that might be improved, the use of lead laboratories in selected technologies, the establishment of graduate fellowships, improved coordination of programs and the review of larger demonstration programs. I have strong confidence in our in-house laboratories and am vitally interested in improving their health. The management challenge is to secure the most from each engineer and scientist we have on board and I plan to make this one of my key objectives.

I have asked Dr. Robert Hermann, formerly an Assistant Secretary of the Air Force, to head a group to work on the laboratory recommendations and to report to me in the late spring of 1982. Also, I have a group of distinguished university personnel investigating possible courses of action for me to take with respect to university matters. The proposed Assistant Secretary of Defense for Research and Technology will be working with the Services and Defense Agencies to insure that we exploit every opportunity to improve the quality of the S&T Program and the institutions that support it.

The Department of Defense shares with industry and academia a need for engineers and scientists, and we are all seriously concerned about the effect of some recent trends in education. The number of graduate students in engineering is down, and about half of those receiving Ph.D.'s are not U.S. citizens. The Military Services will be offering for the first time graduate fellowship in selected technologies in order to develop a core of highly trained

engineers and scientists for its special needs. There is a need to also develop well trained technicians and support personnel, and to motivate talented high school youngsters to enter technical fields. The DoD has a high school apprenticeship program to introduce high school students to technology by working in DoD laboratories. I feel very strongly that talented and motivated people who are technically trained can help to ensure a strong national defense.

E. CONCLUSIONS

As I indicated earlier, our future well-being is dependent on a sound national science and technology infrastructure. We in DoD are obligated to take all practical action to nurture the creation of new military technology which provides us increased military capabilities. The processes are extremely complex and the barriers to accomplishing this goal are many. However, I fully intend, along with my staff, the Services, and the Defense Agencies, to undertake strong and vigorous actions to make the technological future of DoD a bright one.

VII. STRATEGIC AND THEATER NUCLEAR FORCES

A. STRATEGIC WARFARE AND C³I

1. Mission Area Definition

The strategic warfare and command, control, communications, and intelligence (C³I) area comprises forces and the supporting C³I structure necessary to deter strategic nuclear attack on the U.S., its forces, and its allies by holding at risk many of those things which the Soviet leaders value most: their military forces, political control within the Soviet Union, and their industrial base, and to deny the Soviets their strategic objectives by defending our assets. In the event of war, these forces must be capable of a deliberate, controlled response to National Command Authorities (NCA) direction against a broad range of enemy targets to bring about an early termination of war, leaving the U.S. and its allies in a relatively favorable position.

The forces included within this mission area are land-based intercontinental ballistic missiles (ICBMs), sea-based submarine launched ballistic missiles (SLBMs) and cruise missiles, long range strategic bombers and their weapons, North American air defense components, ballistic missile defense, space defense assets, attack warning and assessment assets, and the associated command and control network between the NCA and the individual forces. Since failure of our command and control network would cause serious degradation in the employment of our strategic forces, I am carefully integrating command and control requirements into our force acquisition strategy.

I will see to it that we no longer buy weapons without first assuring that they can be reliably connected to the NCA.

2. Current Status

Although the strategic forces of the two superpowers were recognized to be at approximate parity when the SALT I agreements were signed in 1972, most current measures now favor the Soviet Union. The momentum of the Soviet weapons-building program will cause this condition to worsen before U.S. strategic programs can be fielded to reverse the trends.

Our current strategic forces have deficiencies which must be corrected if we are to achieve some measure of equivalence with the Soviet Union. The forces lack a capability to survive and endure throughout an extended conflict. The current bomber force and its supporting tankers have poor dispersal and base escape characteristics, uncertain resistance to nuclear effects, and questionable ability to penetrate Soviet defenses in the late 1980s and early 1990s. The present Minuteman and Titan systems are becoming increasingly vulnerable to a Soviet first strike due to Soviet accuracy improvements and warhead fractionation. Although the sea-based forces are expected to remain survivable and have better endurance than other strategic forces, they should be improved by increasing missile accuracy and range/payload capability, and providing an ability to receive directions from the National Command Authorities and report back during periods of extended conflict. Our attack warning systems do not provide coverage of all threat corridors and cannot accurately assess attack size nor accurately predict the damage that the attack is likely to cause. The key issue in strategic C³I is

that the current systems were designed to support a policy that views massive retaliation as the primary role of strategic nuclear forces. These systems must be restructured to support an employment policy which includes flexible response as well as long-term survivability and endurance. Finally, our strategic defenses including ballistic missile defense, antisatellite capabilities, and air defense are essentially non-existent.

The result of these deficiencies is a serious instability in the strategic balance which will become more acute during the next few years. The capability of our forces to survive, endure, and withstand the Soviet capability for protracted conflict must be improved to deter Soviet aggression and coercion and, should conflict occur, to preserve U.S. post war posture and international influence.

It is important to recognize that war-fighting capabilities are an integral part of the Soviet doctrinal perspective. We are not choosing a war-fighting strategy over a deterrent strategy. However, we must recognize the Soviet strategy and capabilities as they exist, not as we might wish them to be. If we cannot cope with Soviet war-fighting capabilities, we will have a weak deterrent and a serious susceptibility to nuclear blackmail. The strong deterrent that we seek requires that we be able to successfully thwart all strategies that the Soviets are capable of pursuing.

In recognition of the need to eliminate the imbalance of U.S. strategic forces relative to the Soviet Union while reducing the dangerous instability of the current strategic relationship, we have carefully evaluated our strategic force problems on a mission

area basis. The result of this evaluation is a comprehensive package of strategic programs, as announced by the President last October, which will redress the serious weaknesses in our current posture and place us in a position to reshape the U.S./Soviet strategic competition in the years ahead. We have thereby created a comprehensive strategic modernization plan that will meet the objectives of our strategy, serve as a coherent instrument of national policy, and greatly strengthen our deterrent posture. This long-range plan, consisting of the five mutually reinforcing elements discussed below, should be addressed as a complete package. What we have accomplished in defining these long-range efforts, and what we hope to accomplish by carrying them out, depend in large measure upon your approval of the long-range nature of this effort. Our effectiveness in accomplishing our objectives will be weakened if a year-by-year approach is employed.

3. Strategic Force Programs

a. Command, Control, Communications, and Intelligence

(C³I) Systems

Strategic C³I systems are essential to the effective employment of our nuclear forces and, therefore, to credible deterrence. Our modernization of these systems in the past has not provided systems with the requisite survivability, durability, and reliability to maintain connectivity or to operate over an extended period after a Soviet attack. We need systems that will be as survivable and enduring as the nuclear systems they support. This requires enhanced warning and attack assessment; mobile command centers that

could survive an initial attack and endure during a protracted nuclear conflict; and survivable, endurable communications links. We are improving the survivability, performance, and coverage of radars and satellites used to warn us of a Soviet missile attack and assess its size and scope, including the deployment of mobile ground terminals, upgraded survivability and improved capabilities for our warning satellites, and the deployment of additional PAVE PAWS surveillance radars. We are upgrading the survivability and capability of command centers that would direct U.S. strategic forces during a nuclear war including the deployment of E-4B airborne command posts to serve the National Command Authorities in time of war, the enhancement of the EC-135 airborne command posts serving military commanders through the installation of upgraded satellite and very low frequency/low frequency communications and aircraft hardening against nuclear effects, and the replacement of the obsolescent EC-130 TACAMO airborne relay system with a follow-on more mission capable aircraft. We are also deploying additional survivable communications that link command centers with all three elements of the Triad.

In order to eliminate the danger that the Soviets would use protracted war tactics to exploit the limitations of our C³I posture, we are initiating a vigorous and comprehensive research and development program leading to a C³I system that would endure for an extended period beyond the first nuclear attack

b. Bomber Forces

To eliminate the survivability and endurance deficiencies of the aging B-52 force we will develop a variant of the B-1 bomber,

the B-1B, and plan to procure 100 aircraft with the first squadron operational in 1986. We are also continuing a vigorous research and development program for an Advanced Technology Bomber (ATB), incorporating "stealth" technology, for deployment in the 1990's.

Our two-bomber program is the best approach to ensure the continued viability of our strategic bomber force into the next century. The B-1B will ensure our ability to penetrate Soviet air defenses well into the 1990s as the B-52 becomes increasingly vulnerable and will make a highly effective cruise missile carrier and conventional bomber thereafter. The ATB will provide us with high confidence that our strategic bomber force will continue to have the ability to penetrate Soviet air defenses into the next century.

Building the B-1B now will allow time to resolve technical and operational uncertainties associated with the ATB. Most important, we cannot afford to wait until the ATB becomes available. We must build the B-1B to eliminate vulnerabilities and dangerous instabilities that we would otherwise face during the late 1980s. Finally, building two bombers will stimulate competition and provide us the flexibility to adjust bomber procurement depending on future strategic needs.

In the near-term we are continuing to modify our newer B-52's (G and H models) to carry cruise missiles. The first squadron of cruise missile equipped aircraft (B-52G's) will be operational in 1982. Selected B-52's are being modernized to provide added protection against the effects of nuclear explosions (particularly electromagnetic pulse effects) and to improve their ability to survive against Soviet air defenses through installation of additional electronic counter-

measures equipment. We are considering dispersal of our alert B-52's to more bases in peacetime in order to enhance their survivability. Older B-52's (D model) will be retired starting in 1983. Finally, existing KC-135 aerial tankers are being outfitted with new engines to increase airborne refueling capabilities.

c. Sea-Based Forces

Our sea-based strategic forces currently represent the most survivable element of our strategic Triad. We are further strengthening this force through continued construction of Trident submarines at a steady rate of one per year after FY 1983 and through development of a larger and more accurate Trident II (D-5) missile.

The Trident II missile, scheduled for deployment in Trident submarines beginning in 1989, will have the capability of carrying more warheads as well as larger warheads than the current Trident I (C-4) missile thereby effectively using the growth room in the Trident submarine missile tubes. The Trident II missile will nearly double the capability of each Trident submarine thereby avoiding a reduction in sea-based capabilities in the 1990s when our current Poseidon submarines reach the end of their service lives and must be retired. The Trident II missile will also have much better accuracy than current sea based missiles, thereby providing our sea-based forces with the ability to effectively attack the full spectrum of targets in the Soviet Union. Because of the importance of the Trident II System, we are examining ways to accelerate its initial operational capability.

We plan to put nuclear armed land attack cruise missiles on nuclear attack submarines and several classes of surface combatants

starting in 1984 in order to deploy a force of highly accurate nuclear warheads at sea in the near term. Deployment of these missiles will strengthen our strategic reserve and deter the use of nuclear weapons against our naval forces worldwide.

d. ICBM Modernization

The MX missile development is proceeding on schedule and within programmed costs, and the first flight is scheduled for early 1983. The Multiple Protective Shelter (MPS) basing scheme has been cancelled. For long-term basing of MX we have initiated vigorous research and development programs on three options. These options are: Deep Basing, deployment of MX in survivable locations deep underground; Continuous Patrol Aircraft, a survivable long-endurance aircraft that could launch MX; and Ballistic Missile Defense for active defense of land-based MX missiles. Because of the great improvement it can provide in effectiveness of BMD, the concept of deceptive basing will be included. We plan to choose among these long-term basing options as soon as sufficient technical information becomes available and will strive to make a decision no later than 1 July 1983, as directed by the Congress.

The MX missile becomes available in 1986 and the first 40 missiles will be deployed in existing Minuteman silos. Specific locations will be decided in the near future. This interim deployment in silos is the most rapid method of providing us with the advantages of the MX missile with its improved accuracy, increased payload, and prompt hard target capabilities. Depending on the option or options selected in 1983 for permanent basing, these silos with MX missiles may become part of the permanent basing plan.

We are continuing to monitor Soviet activities in Ballistic Missile Defense.

Finally, we will deactivate all Titan missiles as soon as possible.

e. Strategic Defense

Restoration of our strategic defenses is mandatory if we are to have a credible national security policy. The first steps toward restoring adequate strategic defenses will include the following programs:

- o In coordination with Canada, upgrade the North American air surveillance network including a combination of new over-the-horizon backscatter (OTH-B) radars and improved versions of today's line of sight radars.
- o Replace five squadrons of aging F-106 interceptors with newer F-15's.
- o Buy at least six additional Airborne Warning and Control System (AWACS) aircraft for North American air defense to augment ground based radars in peacetime and to provide surveillance and control of interceptors in wartime.
- o Continue to pursue an operational antisatellite system.
- o Pursue a vigorous research and development program on ballistic missile defense for active defense of land-based missiles. This program will include technologies for space-based missile defense.
- o Develop an expanded, cost effective civil defense program in coordination with the Federal Emergency Management Agency.

In the years ahead we plan to continue our review of strategic defense to determine what additional steps may be needed to achieve a credible strategic defensive force posture.

f. Strategic Arms Reduction Talks (START).

The U.S. is currently performing a major review of our START arms control policy. It is expected that this review will be completed in the near future and, if circumstances permit, we will begin START negotiations with the USSR at the appropriate time. During the review we have told the Soviets that we will take no actions to undermine current agreements as long as they behave in a similar manner. We are also performing an intense review of the ABM treaty in preparation for the second five-year review scheduled for the fall of 1982.

B. THEATER NUCLEAR WARFARE AND C³I

1. Mission Area Definition

NATO's strategy of forward defense and flexible response has long been based on the ability to respond appropriately to any level of potential attack and to pose the risk of escalation to higher levels of conflict. Theater Nuclear Forces (TNF) are an essential component of this strategy. They strengthen and enhance the links between NATO's conventional forces and U.S. strategic nuclear forces, and provide the United States and its allies, within NATO and elsewhere, with a credible capability to respond across the full spectrum of potential conflict. For the purposes of arms control negotiations these nuclear forces are categorized as intermediate range, short range, defensive and maritime nuclear forces. In this statement the mission area definitions currently in use have been retained.

The Theater Nuclear Warfare (TNW) mission area is made up of battlefield, theater-wide, defensive, and sea control systems. Battlefield systems are those normally associated with the Division and Corps levels and currently include the 8-inch and 155mm artillery fired atomic

projectiles (AFAP) and the Lance missile system. Theater-wide systems provide capabilities and options for deep nuclear strikes as well as shorter range missions throughout a theater and currently include land and carrier-based dual capable aircraft, the Pershing IA missile, and assigned SLBMs. Defensive systems currently include the Nike Hercules air defense system and the medium and special atomic demolition munitions (ADMs). Sea control systems currently include the fleet anti-air, anti-submarine, and anti-surface ship systems: ASROC, SUBROC, Terrier, and air-delivered B-57 depth bombs.

2. Current Status

There are five broad modernization issues that must be addressed regarding our Theater Nuclear Forces. First, we must continue to improve the survivability of our forces to nuclear effects, chemical attack, and conventional and terrorist attack, with particular focus toward the aggregate force since this is the basic prerequisite to establishing our credibility. Second, we need to ensure that there is an adequate, survivable, and enduring supporting C³I system. Third, we need to achieve a balanced mix of forward-deployed Theater Nuclear Forces, including battlefield, theater-wide, and sea control systems. Further, we must replace, with some urgency, weapons which are nearing the end of their useful life or are obsolete. Finally, we must continue our efforts to upgrade the security and safety of our deployed weapons.

As an integral part of the NATO TNF modernization decision, the U.S. and NATO agreed to withdraw 1,000 obsolete nuclear warheads from Europe. This withdrawal was completed in December 1980.

The Soviet buildup in TNF increasingly threatens the survivability of NATO TNF. As a consequence we must work toward reducing the vulnerability of NATO TNF deployments.

3. Theater Nuclear Force Programs

a. Battlefield Systems

The nuclear Lance surface-to-surface missile is currently deployed with U.S. and other NATO forces. Production of improved Lance warheads, with enhanced radiation/reduced blast (ER/RB) features, began earlier this year. The ER/RB version could be used more effectively in NATO. However, any deployment of this warhead outside U.S. territory will be accomplished only after consultation with our allies.

In July 1981, the Department of Energy began production of a new 8-inch nuclear artillery projectile with ER/RB capability. Compared to the older 8-inch rounds, this round does not require field assembly, has increased range, and has improved fuzing, safety, and security features. Again, deployment outside U.S. territory will not be made prior to consultation with our allies.

A new 155mm nuclear artillery projectile, currently in engineering development, will provide improvements in range, accuracy, yield, fuzing, and denial/disablement features.

The Corps Support Weapon System (CSWS), now in the concept definition phase, is being examined as a replacement for Lance in the early 1990s. This system is envisioned as a mobile Army surface-to-surface fire support missile system designed to support the Corps battle plan by delivering nuclear, chemical, and highly advanced conventional warheads on selected targets. A possible battlefield improvement is an anti-armor capability employing conventional sub-munitions.

b. Theater-wide Systems

Our two priority theater-wide programs are the Ground Launched Cruise Missile (GLCM) and Pershing II (PII) systems agreed to by NATO in December 1979. The modernization decision, of central importance not only for its enhanced military capabilities but also as a symbol of the political determination and cohesion of the alliance, is currently being implemented. Initial deployment of these systems is scheduled for the end of 1983 in the United Kingdom (GLCM) and the Federal Republic of Germany (PII), and early 1984 for GLCM in Italy. Pershing IIs will replace the U.S. Pershing IAs on a one for one basis in the Federal Republic of Germany by the end of 1986. We plan to deploy 464 GLCMs in Europe by the end of FY 1988.

As an integral component of the December 1979 modernization decision, the NATO ministers committed themselves to TNF arms control negotiations with the USSR. Preliminary exchanges between the U.S. and the Soviet Union on arms control involving TNF were held in late-1980. Both the U.S. and the Soviets have expressed their intention to maintain communications on arms control issues and we have expressed our willingness to participate in meaningful arms control negotiations. On 18 November 1981, President Reagan stated the U.S. position which is to cancel deployment of Pershing II and ground launched cruise missiles if the Soviets will dismantle their SS-20's, SS-4 and SS-6 missiles. U.S./Soviet negotiations on Intermediate-range Nuclear Forces (INF) began in Geneva on 30 November 1981.

The bomb stockpile is also being upgraded through continued deployment of the B61 Mod 3 and Mod 4 which have enhanced safety and security features. The Department of Energy is planning to begin a

Stockpile Improvement Program in FY 1983 to retrofit older B61 versions with enhanced security, safety, and command and control features.

As discussed earlier, nuclear armed land attack cruise missiles will be deployed on nuclear attack submarines and surface combatants starting in 1984.

c. Defensive Systems

Currently there are no plans to replace land based defensive TNF systems with new nuclear weapons. The number of ADMs and Nike Hercules will be gradually reduced as improved conventional capabilities are achieved.

d. Sea Control Systems

As part of our continuing assessment of the future role and utility of naval nuclear systems we have initiated, in conjunction with the Department of Energy, a feasibility study to define a nuclear warhead for the Common ASW Standoff Weapon for deployment near the end of the decade. A similar feasibility study is presently being conducted to define a nuclear warhead for the Phoenix air-to-air missile.

e. TNF Safety, Security, and Survivability

As we continue to pursue more survivable nuclear forces we must also concern ourselves with the peacetime environment. We are therefore placing emphasis, in coordination with the Department of Energy, on measures to insure that our TNF systems remain safe and secure. Some of the improvements being included or considered for our newer TNF systems are insensitive high explosives, improved command and control devices, enhanced electrical safety features and packaging, non-violent command disable systems, and continuing storage site security upgrade and transportation safety and security features.

VIII. TACTICAL WARFARE

A. TACTICAL WARFARE PROGRAMS OVERVIEW

1. Broad Goals and Objectives

The main goals of our Tactical Research, Development, and Acquisition (RDA) programs are to improve the military balance vis-a-vis the Soviet Union in both conventional and theater nuclear warfare, to improve our defensive and retaliatory posture so as to deter attack by the Warsaw Pact, and to be ready to exert a stabilizing influence in those areas of the world that are deemed of vital interest to the U.S. Our RDA strategy is closely tied to the NATO Long Term Defense Plan and our plans for the Rapid Deployment Force. Within these broad goals a key objective is to integrate fully the supporting Command, Control, Communication and Intelligence (C³I) activities which must have the same priorities as the systems and force capabilities they support.

2. Mission Area Definitions

a. Naval Warfare

Naval Warfare programs are oriented toward maintenance and improvement of capabilities essential to free use of the seas. Principal missions in Naval Warfare are to: protect the sea lines of communication linking us to the territory of allies threatened by external aggression; protect merchant ships carrying U.S. foreign trade and support our allies in protecting their own trade; and protect our own territory and assist our allies in protecting their territory from attack by hostile maritime forces. Naval Warfare forces include not only those which defend shipping against direct threats, but those sea-

based air and amphibious assault forces which can strike at threats before they can reach the sea lanes. This will soon include our attack submarines, since the deployment of cruise missiles on attack submarines will improve our ability to strike targets previously out of range of both carrier aircraft and attack submarine weapons.

b. Land Warfare

The Land Warfare mission area includes all Army and Marine Corps non-nuclear/non-chemical weapons systems except for Marine Corps fixed wing tactical aviation. This mission area also encompasses all rotary wing aircraft.

c. Air Warfare

The objectives of the Air Warfare mission area are to provide capabilities required to gain and maintain air superiority and to conduct close air support and air interdiction. Air superiority addresses capabilities required to counter enemy air operations. Close air support provides coordinated fire power support to friendly forces engaged in direct combat. Interdiction is aimed at disrupting enemy force reinforcement and resupply. Interdiction operations restrict the combat capability of the enemy by delaying, disrupting, or destroying their lines of communication, their forces, and their resources. Naval strikes ashore are also included in the interdiction area.

d. Mobility and Special Projects

The Mobility mission area includes both inter-theater and intra-theater mobility, comprising airlift, sealift, and prepositioning of equipment on land and at sea and the required C³ to support these elements. The objectives of this mission area are to provide the capability

to respond rapidly not only to emergencies in NATO, but also to contingencies wherever they might occur.

Special Projects include those activities that enhance two or more of the various tactical warfare mission areas. Currently, there are two primary areas of responsibility: (1) The physical security mission including the protection of nuclear and chemical weapons as well as providing adequate and cost-effective physical security for other mission critical resources; and (2) The propulsion area involves providing reliable and modern propulsion systems for tactical weapon systems such as aircraft, land combat vehicles, ships, and air launched missiles.

B. NAVAL WARFARE

The Naval Warfare mission area includes capabilities in Anti-Air Warfare, Anti-Surface Warfare, Anti-Submarine Warfare, Amphibious Assault Warfare, and Mine Warfare.

The missiles fired from Soviet submarines, surface ships, and especially naval strike aircraft constitute a very serious threat to our fleet. New systems--including Aegis, the SM-2 missile, and close-in weapons systems (CIWS)--will strengthen our fleet's missile defenses.

As missile standoff ranges become greater and as the Soviet naval air force gains more and more flexibility to reach out and strike from any azimuth, our carrier-based air defense aircraft become less and less able to detect and counter raids. The only solution is to extend our own reach to find and attack hostile strike aircraft long before they approach our ships. This is a task for land-based and space-based sensors and land-based interceptors in addition to the more familiar

ship-based systems. It must involve our Air Force and the air and naval forces of our allies, linked into one unified whole with effective C³. A variety of acquisition programs--including the Integrated Tactical Surveillance System (ITSS) study, Air Force and Navy efforts on Over the Horizon Radar (OTHR), the upgrading of the AIM-54 Phoenix Missile, the Air Force's E-3A AWACS and F-15 fighter procurements, and the Navy's procurements of E-2C AEW aircraft and F-14 fighters--all have vital parts to play in this role.

The air-launched missile threat is unique because of the enormous weight of attacks that the Soviet naval air force can generate and the frequency with which they can be repeated. Submarine-launched missile attacks, however, also are extremely taxing, especially so because the missiles may get within a few miles of our ships before we have any warning, leaving only seconds to react. Torpedo firing submarines also continue to pose a very dangerous close in surprise threat. Again, this compels us to supplement our local Antisubmarine Warfare (ASW) defenses with offensive forces to seek out and destroy submarines. The primary contributors to this are our integrated undersea surveillance system (IUSS) and U.S. and allied maritime patrol aircraft (MPA) forces equipped with the P-3 Orion. Mines and our own submarines in forward area patrols also play a key role and greatly increase our assurance of prevailing. It requires a sustained, intense effort to upgrade and modernize these systems--particularly in their sensors and weapons--to stay ahead of the rapid Soviet strides in submarine technology and utilization. To back up these area and barrier ASW forces we are in-

vesting heavily in local defense systems which will increase our capabilities to counter torpedo firing submarines and those armed with shorter-range missiles. These include the SH-60B, LAMPS MK III, SH-2F, LAMPS MK I procurements, SQR-19 Tactical Towed Array Sensor System (TACTAS), and SH-60 CV Variant helicopter developments. The Advanced Lightweight Torpedo (ALWT), Mk 48 advanced capability (ADCAP) heavy torpedo, and common ASW standoff weapon programs all represent vital developments to enable us to attack the advanced submarines the Soviets are now building; they are essential to every phase of ASW.

In the Anti-Surface Warfare (ASUW) mission the conventional Tomahawk and Harpoon missile systems provide a non-carrier, anti-ship strike capability beyond the range of surface guns. The Tomahawk Anti-Ship Missile (TASM) is a 250 nmi offensive weapon capable of launch from either submarines or surface ships and will overcome the current Soviet anti-ship cruise missile standoff range advantage. The Medium Range Air-to-Surface Missile (MRASM), a air-launched variant to the TASM, provides pinpoint accuracy via IIR terminal guidance for the antiship role as well as the land attack mission. The Norwegian Penguin system is being evaluated by the U.S. Navy and potentially could provide short range missile capability for smaller U.S. ships. An area to which we are going to have to devote further attention is that of fire support for our forces ashore. The 5" gun systems on which we currently depend for much of the fire support capability are deficient in range, accuracy, and flexibility of terminal effects.

In the amphibious warfare mission many amphibious ships are nearing retirement age, and the lift capability is limited by the relatively small size of the current force. The amphibious force is being upgraded by the addition of the Landing Craft Air Cushion (LCAC) vehicle. An initial procurement of 12 LCACs is planned over three years, FY 1982 through FY 1984. This will be followed by a full rate production of 12 per year. The Navy plans to improve the amphibious lift during the Five-Year Defense Program by procuring enough capability to lift both a Marine Amphibious Brigade and Marine Amphibious Force simultaneously.

In the mine warfare area, the U.S. is currently deficient in mine countermeasures (MCM) capability for carrying out our mine sweeping and mine hunting missions. The CAPTOR deep water ASW mine program is proceeding and will ultimately provide a deep water capability in the NATO family of mines. Several foreign mine countermeasure systems are currently being evaluated under the Foreign Weapons Evaluation (FWE) program.

C. LAND WARFARE

Within the Land Warfare mission area there are development and acquisition programs underway to meet the needs of the Services, provided these programs are adequately funded and managed to reach fruition. This does not mean we plan to match the threat in numbers. We do plan, however, to build forces whose capabilities will be formidable and adequate to their missions.

Perhaps the main deficiency within the Land Warfare mission area derives in large measure from the issue of affordability. We face difficulties in the timely fielding of adequate numbers of the systems which we have

developed. These deficiencies can be overcome only if adequate funds are available and if program cost growth is controlled. We also have deficiencies in some command and control aspects of our Land Warfare assets.

To improve our air defense arsenal, the Division Air Defense Gun is just entering limited production and we plan to increase production of STINGER for our rapid deployment forces.

To increase amphibious assault capabilities of our Marine forces and to meet the Services' long term needs for rotary wing assault, transport and special mission aircraft we are now beginning joint service development of a new generation of advanced but mature technology Rotary Wing aircraft to be introduced in the early 1990's.

The light divisions of the Army and the Marine Corps need new, more easily deployable armored vehicles. The first of the light armored vehicles will be fielded shortly. These near-term systems will be followed in 1988 by a more advanced Mobile Protected Gun System common to both services.

D. AIR WARFARE

In the Air Warfare mission area we are maintaining a vigorous program of research, development, test, and evaluation to modernize our aircraft fleet and to provide the best possible combination of aircraft, munitions, and C³I. Arriving at the best possible combination requires close examination of cross-service capabilities, cost, timeliness and threat evolution. Close air support and interdiction capabilities will be the result of acquisition of an effective mix of aircraft and conventional munitions. Intensive effort is underway to

improve our night, all weather, low altitude capability for tactical aircraft. Similarly we will provide a standoff munition delivery capability. Existing capabilities to suppress enemy air defenses include a mix of lethal and non-lethal techniques. The Air Force F-4G Wild Weasel is the primary current lethal option. For Naval strike we use the A-6 and A-7 attack aircraft armed with conventional ordnance, plus non-nuclear Walleye and Standard Arm/SHRIKE (lethal Defense Suppression). U.S. air superiority can be achieved by a proper mix of F-4, F-14, F-15, F-16 and F/A-18 aircraft with support from electronic warfare (e.g., Wild Weasel F-4G, EA-6B and EF-111) and early warning and control aircraft. All but the F-16 are all weather, air-to-air capable. Current ordnance includes AIM-7 (Sparrow) and AIM-9 (Sidewinder) missiles plus the AIM-54 (Phoenix) (F-14 only).

Existing defense suppression systems such as SHRIKE and STANDARD ARM have limitations that are addressed by HARM. HARM is a higher velocity (shorter time of flight) anti-radiation missile that has an expanded frequency coverage to respond to a broader range of threats. The program has experienced development problems which have dictated a stretchout, but operational testing and low rate production are in progress. HARM will greatly enhance our ability to suppress defensive missile systems used to attack our aircraft. Because it is quite expensive, the programmed HARM procurement quantities are not as large as we need, and a greater production rate of this joint service missile will be considered in later years.

In the area of naval attack we possess only a limited night/all weather capability and limited standoff weapon capability. The Navy

is continuing to improve capabilities in this area by programs to integrate Forward-Looking Infrared (FLIR) pods on the A-7, Target Recognition Attack Multisensor (TRAM) FLIR on the A-6E, and a new FLIR pod for the F-18. The F-16 avionics are being modified to include a more powerful radar and other changes to permit interface with the Advanced Medium Range Air to Air Missile (AMRAAM). In the air-to-surface mission area, we are improving our capability to conduct operations in night/adverse weather/low altitude conditions. The USAF is proceeding with research on the Low Altitude Navigation Targeting Infrared Night (LANTIRN) system for the F-16 and A-10 aircraft. This program has been restructured at my direction due to excessive cost growth. Development of the Joint Medium Range Air to Surface Missile is proceeding in order to improve our airfield attack capability. In addition, our existing transportable tactical air control systems make excessive demands on our limited mobility assets and are nearing the end of their designed life time. Introduction of a mobile tactical control system is underway.

E. MOBILITY AND SPECIAL PROJECTS

This past year, the Department of Defense completed an extensive study of U.S. mobility requirements including the total mix of airlift, sealift, and prepositioning required for contingencies in the Indian Ocean area and other areas of potential conflict during the 1980s. The study identified deficiencies in all areas of our mobility forces and specifically recommended increases in sealift, airlift, and prepositioning. Service programs will significantly reduce the identified shortfalls.

To support the Rapid Deployment Joint Task Force ships have been prepositioned in the Indian Ocean loaded with enough equipment to support a Marine Corps Amphibious Brigade (MAB). This capability will be increased to support three brigades by acquiring or chartering a sufficient number of maritime prepositioning ships. There are plans to acquire two additional SL-7 containerships for a total of eight. All of these will be converted to roll-on/roll-off (RO/RO)/break-bulk configurations specifically designed to facilitate rapid loading and unloading of military equipment (primarily vehicles, tanks and helicopters) to provide fast sea-lift for non-prepositioned equipment and supplies.

The C-5A is currently our only aircraft capable of carrying outsized cargo. There is an ongoing program to modify the C-5A to correct a deficiency in the fatigue life of the wing structure and extend fatigue life by 30,000 hours. In order to increase the utilization of the C-5 and C-141 aircraft, additional spares are being procured and the Reserve Associate C-5 crew ratio will be increased to 2.0 crews per aircraft by the end of FY 1984. The Air Force has initiated a program to preposition support equipment to reduce the amount of inter-theater airlift required in case of a contingency.

Numerous studies since 1974 have shown the need for more outsized/oversized airlift -- the most recent of these was the study mandated by Congress. In order to redress this shortfall we plan to procure fifty new production C-5 and forty-four additional KC-10 aircraft.

This improvement is required to allow the rapid application of our projection forces to wherever a crisis might occur including NATO and Southwest Asia.

C³ systems required to support the mobility mission are unique due to the mixture of civilian and military assets that comprise the mobility force. C³ to support our sealift assets are being improved through plans for the formation of Navy Embarked Action Teams with associated communications equipment to be stationed aboard maritime ships included as part of our sealift assets. In an effort to improve the C³ systems for our airlift assets, there is an ongoing program to establish a comprehensive upgrade plan for the Military Airlift C³ system. This and other near-term improvements will provide the capability to extend our C³ into austere locations allowing more efficient use of scarce airlift assets. The present mobility C³I assets need improvement in the areas of both chemical and nuclear survivability, security, and jam-resistance. These deficiencies will be corrected with the procurement and fielding of new communications equipment including communications security devices.

One of the areas of Special Projects is Physical Security. The Army, as executive agency for interior physical security systems, is pursuing development of a DoD standardized interior system under the Facility Intrusion Detection System program. The Air Force, as executive agency for exterior security systems, is developing a standardized exterior security system under the DoD Base and Installation Security System program. Interoperability and interface designs between these two systems are being

monitored by a Tri-Service Integration Working Group. Currently there is a lack of an electronic sensor system capability required to provide physical security protection for resources deployed in either a semi-permanent or mobile mode. Guidance will be provided to the responsible Executive Service to develop this capability to be available in CY 1987.

In the area of propulsion for aircraft, land combat vehicles and ships, increased emphasis is being placed on mission oriented durability testing in both Full Scale Engineering Development and in Advanced Development. A primary objective for new developments and/or derivative systems is to achieve a better balance between performance and other critical features such as durability, operability, reliability, supportability, and life cycle cost. Erosion of the propulsion industrial base must not be permitted to further reduce our capability to respond to expanded force structure requirements. Lead times for both raw materials and finished parts need to be reduced substantially. Multi-year procurement of sufficient quantity buys are planned not only to achieve economies but also to retain an incentive for competition and to aid in stabilizing the industrial base.

F. ACQUISITION STRATEGY

Although the DoD has strived for acquisition efficiency over the years, costs have increased, system development times have increased, and industry, in many cases, has turned its back on defense. This year DoD announced a series of major initiatives to improve the acquisition cycle. Most of the concepts are not new and efforts have been made in the past to implement a number of the management improvements. Our plan is to dedicate ourselves to implementing these initiatives. Programs

will be measured against these principles and every effort will be made to build our acquisition plans around them. I can assure you that the present leadership is devoted to this quest.

I would like to discuss a number of these initiatives to illustrate the thrusts we seek and provide some examples of our efforts in the tactical warfare area.

1. Long Range Resource Planning

We must begin with realistic long range planning. This is essential to success since only proper plans permit a blending of readiness, modernization, and affordability and will improve stability of needed programs. This planning must also include improved interoperability and standardization among U.S. and Allied Forces. We have prepared mission area plans and staff studies in critical areas to define requirements and identify problems and shortcomings. These efforts will be applied to the development of the Defense Guidance and will be used in the analysis of broad planning alternatives for resource allocation.

2. Decrease Cost Growth

We have witnessed increases in the cost to develop and produce weapons. We must control this cost growth and we must not tolerate it as an inevitable result of general inflation. A number of initiatives are underway to accomplish this control of cost growth.

a. Competition

Whenever it has been found to be sound, we have insisted on competition, including second sources for production. However, achieving competition can itself be initially costly; funds for development fly-offs

or drive-offs and production qualification of second sources are but examples. We encouraged the Air Force to maintain competition in the AMRAAM program, and the plan now is to use the leader/follower approach to introduce during full scale engineering development a second source for production. Other examples of our drive for competition are our plans for a second source producer of the I²R Maverick and, possibly, the anti-armor HELLFIRE. In the Advanced Light Weight Torpedo program we plan to have competition by using a leader/follower approach during production. The Navy is attempting to obtain second source producers for "government furnished equipment" for the F/A-18. The Army has awarded mutual study contracts to prospective second source producers of the Infantry Fighting Vehicle as an initial step in determining whether qualifying an additional producer would be beneficial.

b. Economic Rates of Production

If we can afford the outlays, we plan to increase the production rate of several systems to reduce the unit cost of production. Among these are the SH-60B helicopter, the F-16 aircraft, Laser HELLFIRE missiles, the Fighting Vehicle System and the DIVAD gun system. In general, these initiatives to reduce costs generate demands for increases in near-term outlays. To afford these efficiencies, we simply will have to terminate lower priority programs.

c. Multi-year Funding

We have encouraged multi-year contracting because we expect average dollar savings of roughly 10% or possibly even up to 20% in unit procurement cost through resulting economies and efficiencies. The Navy C-2 aircraft and the Air Force F-16 procurements are examples of a major

initiative to achieve savings and improve the acquisition process through multi-year procurement. In FY 1983 we plan to extend multi-year contracting to stable programs such as the CH-47D helicopter.

d. Joint Programs

We are supporting joint programs such as the near and far term light armored vehicle programs and advanced rotary wing aircraft program when we can meet the needs of more than one service. Joint service programs such as the Army/Navy Modern Technology (turboprop/shaft) Engine and the Air Force/Navy Advanced Technology Fighter Engine are being pursued to effect developmental economies. In this entire area of affordability we must make cost a major factor in design.

3. Shorten Acquisition Cycle

We are transitioning to a two milestone acquisition cycle. OSD will be directly involved in the decision making process only at critical points. The Army's Scout helicopter program is being managed in this manner (Milestones II and III combined). Two recent successful Army programs had significantly shorter than normal acquisition times; we can learn much from the experiences in acquiring the Division Air Defense Gun and the Multiple Launch Rocket System programs.

Another key element for shortening the cycle is Preplanned Product Improvement. For example, the F-16 is commencing the Multi-national Staged Improvement Program (MSIP) to improve capabilities on a graduated scale and the M1 tank has some planned block changes in the area of NBC survivability, armor improvements, and substitution of a 120mm gun for the present 105mm.

Another means of shortening the acquisition cycle is the selected procurement of off-the-shelf equipment, such as the light armored vehicle and foreign weapon systems, which meet basic U.S. requirements. This approach potentially also enhances our goal of complementarity with our allies; it is being vigorously pursued by the Services through their participation in the Foreign Weapons Evaluation program.

4. Speed Technology Transition

For too long we have witnessed technologies that remain in development for years prior to being utilized in a rational weapon system. We are taking action to move promising technology more quickly. My office is encouraging the development of a joint Army/Air Force program to develop and acquire a second generation common Imaging Infrared (I²R) seeker and directing a joint Army/Air Force program. Another example is our attempt to transition the tilt rotor concept from advanced technology to development through a joint Army, Navy and Air Force rotary wing aircraft development program.

5. Military Operational Readiness

One of my major objectives is to increase force readiness by establishing readiness goals early in the acquisition program and monitoring progress. For example, the F-18 program incorporated coordinated readiness objectives prior to commencement of full scale production.

6. Industrial Readiness

Since we cannot dictate the length of a war, we have an urgent requirement to ensure sustainability and support for our forces. Questions as to how much readiness, the number of tooling machines in

lay away and the number of skilled workers standing ready are not easy to answer. But I can assure you we are trying to develop a balanced solution to the dilemma. One noteworthy effort in this direction is that the air-to-air missile programs have developed qualified second sources--General Dynamics and Raytheon for Sparrow and Raytheon and Ford for Sidewinder. The result is an excellent industrial base having a significant surge capability. Our plan is to do the same with the Advanced Medium Range Air-to-Air Missile (AMRAAM). We are pursuing this by making DoD munitions requirements known to industry and thus allowing them to prepare stable development and procurement programs.

IX. CHEMICAL WARFARE

A. INTRODUCTION

Early in my review of our defense posture, I recognized the threat which is posed by the formidable Soviet chemical warfare capability, and I have acted to redress this imbalance. This includes significant increases in defensive research, development, and acquisition and support for modernization of our inadequate chemical retaliatory capability.

The objective of our chemical warfare program is the development of a credible retaliatory and protective capability to deter the use of chemical warfare against U.S. or allied forces. Should deterrence fail, it will provide a sustained military operational capability in a chemically contaminated environment. The U.S. and other NATO countries are formally committed to the policy of "no first use" of lethal or incapacitating chemical agents by adherence to the Geneva Protocol of 1925 and have sought a complete and verifiable ban on lethal chemical weapons with little success due to the intransigence of the Soviets on the critical issues of verification.

The U.S. and NATO forces today face the threat of chemicals from an adversary which has developed a massive capability to wage chemical warfare for an extended period. Soviet forces are the best trained and best prepared in the world for the use of chemical warfare. Practical field training, including training with live chemical agents, significantly increases their readiness. The Soviets have developed a variety of modern chemical agents, multiple delivery systems,

and the tactical doctrine for large scale employment. Their leadership continues to devote significant resources to research, development, and procurement of more advanced chemical delivery systems and equipment. We are certain that Soviet surrogates have used lethal chemical agents in Laos and Kampuchea and that lethal chemical agents have been used in Afghanistan. Recent physical evidence confirms that biological toxins of the mycotoxin type have been used in Kampuchea and Laos to produce the widely reported "yellow rain."

The impact of a chemical attack would seriously degrade all aspects of tactical combat. Logistical and host nation support provided to the battlefield commander would be reduced in a contaminated environment. Even when protective measures are adopted to save lives, degradation in the performance of the military mission can be as high as 30 to 50 percent.

We have created an OSD level steering committee and have formed an office under the Assistant to the Secretary of Defense (Atomic Energy), ATSD(AE), to manage and coordinate all chemical warfare matters.

B. RESEARCH AND DEVELOPMENT PROGRAMS

The physiological heat stress and psychological burden of the present individual mask and overgarment as well as the loss of dexterity and tactility due to bulky gloves and boots must be overcome by new designs and new materials. Further, improved training equipment and devices and medical innovations in casualty care and handling must be developed. At the same time, an adequate retaliatory capability must be developed if a credible, measureable, and visible deterrent is to

be maintained. These are the conclusions of the 1980 Defense Science Board Summer Study, and their recommendations are now being implemented. In addition, cooperative international programs are being expanded and new Memoranda of Understanding between allies are being developed to include defensive R&D, production, and procurement. Several foreign chemical defense systems are being evaluated under the Foreign Weapons Evaluation Program.

1. Defensive Programs

The R&D programs are being directed to the provision of improved individual protection, collective protection, detection and alarms, decontamination, and medical support.

Remote detection devices are being developed to provide more sensitive, early, and rapid detection and warning. Medical anti-dotes, prophylaxis, personal decontamination, and casualty handling and care efforts are being expanded to enhance the treatment of chemical and chemical/conventional casualties. New and innovative approaches to materials required for the next generation of protective clothing, gloves, and boots are being investigated. Decontaminants and dispensing equipment to improve mobility by thorough, rapid decontamination of personnel, equipment, and areas are under active study. New collective protection systems for armored vehicles and structures to provide rest and relief are receiving increased attention as well as the development of improved safe, simulant materials to allow realistic training and to assess and quantify personnel degradation.

2. Retaliatory Programs

Our present retaliatory stockpile is deteriorating and becoming obsolete as new delivery systems are brought into the inventory, thus, it is losing its effectiveness and its credibility as a deterrent. To maintain the available stockpile, a modest maintenance and surveillance program is in progress. We have not manufactured any chemical agents or filled any munitions since 1969.

Research and development has continued on chemical weapons systems, concentrating on binary weapons, to provide the necessary modernization of the stockpile. A binary weapon is one in which two nonlethal components are packaged separately and only combined while in-flight to the target to form the standard nerve agents. They would provide significant advantages over present munitions in the total life cycle of manufacturing, storage, transportation, and eventual disposal operations. A modernization program would correct the present stockpile deficiencies of mix of agent and munition types.

Research and development in retaliatory programs include engineering development of the Bigeye binary VX aerial bomb. Advanced development of a binary warhead for the Multiple Launched Rocket System and the 8-inch IVA projectile has begun.

In FY 1981, Congress appropriated \$23 million to begin the construction and provide the process equipment for the first phase of an integrated binary munition production facility. This program has the complete support of this Administration, and construction began in October 1981. Plans exist for the 155mm GB artillery projectile (already developed) and the Bigeye binary bomb to be produced.

3. Supporting Programs

Critical to achieving a credible deterrent posture is a comprehensive training program in all Services to improve the performance of military duties while in a chemical environment. The Army chemical school at Fort McClellan has been reestablished to provide this capability as well as update or develop doctrine for maneuvers and the use of equipment in a contaminated battlefield. Similarly, the Air Force has increased chemical defense training at unit level and in technical schools.

A further major problem is the demilitarization of obsolete munitions in the current retaliatory stockpile. At this time, over 650,000 items have been identified for disposal. Beginning in 1982, a research and development program is planned to develop or adapt new technology which will lead to safe, cost effective methods of disposal.

4. Acquisition Status

The major procurement items are the defensive equipment required to provide an immediate survival capability to all forces. These include decontamination systems, detection and warning devices, monitoring equipment, collective protection items for fixed facilities and armored vehicles, and some individual protection equipment such as protective masks.

In addition, operations and maintenance funds are being used to provide expendable items such as protective overgarments, gloves, boots, filters for individual masks and vehicles, and to allow for training and readiness exercises.

C. CONCLUSIONS

Our chemical warfare programs described in this Chapter are designed to develop a credible deterrent to any use of chemicals on the battlefield by improving both defensive and retaliatory capabilities. The research and development in progress will provide an improved operational capability leading to a sustained operational capability in the longer term. The acquisition of new equipment will enhance the capabilities of all forces, both conventional and tactical nuclear, and allow the necessary flexible response options across the full spectrum of potential conflict. Development of a credible chemical warfare deterrent is necessary to allow the protection of U.S. national interests in the worldwide theater of operations.

X. COMMAND, CONTROL, COMMUNICATIONS AND INTELLIGENCE (C³I)

A. INTRODUCTION

The purpose of the C³I system is to support the planning, directing, coordinating, and controlling of the operational activities of U.S. military forces at all echelons, and to degrade the capability to an adversary to perform all of those critical functions. The users of the system range from the National Command Authorities and the Joint Chiefs of Staff through individual Service units. The system must support the needs of these users, throughout the world, in peacetime and during all levels of conflict.

This chapter focuses on the strategic, tactical, and common user C³I assets that support cross-Service and cross-mission needs. These assets include: intelligence, reconnaissance, surveillance, and target acquisition systems to provide indications, warning, strike, and damage assessment information; command and control facilities to support military planning and monitoring of operations; communications systems to provide rapid, accurate, and secure exchange of information among all echelons; navigation and position fixing systems, mapping, charting, and geodesy to support the location of friendly forces, to facilitate the accurate delivery of ordnance, and to support planning and execution of force operations; and electronic warfare (EW) and C³ countermeasures (C³CM) systems to disrupt the performance of enemy weapons and C³ systems and to protect U.S. systems from similar enemy actions. In my opinion, the scope and complexity of these inter-related capabilities is such that the effective management of the C³I program constitutes one of the most

difficult tasks confronting the DoD. This task is particularly challenging because of the unique problems associated with planning, programming and budgeting for systems which require joint Service and allied participation.

The remainder of the chapter is divided into four sections. First, I identify the inherent characteristics of the C³I system and the corresponding attributes that it requires to fulfill its purpose adequately. I then discuss a number of specific initiatives which I have recently undertaken. Some of the initiatives have begun to take effect and I will identify several significant accomplishments that we have realized during the past year. I will then summarize with a brief overview of our perspectives on this complex program area.

B. C³I CHARACTERISTICS AND REQUIRED ATTRIBUTES

The C³I system has four basic characteristics that fundamentally influence the way we manage the program.

- o The C³I system is not a loose aggregation of sensors, jammers, communications, and computers but is a vital component of the total C³I-weapon system mix.
- o The C³I system must gradually evolve from its current state, as individual components are upgraded or replaced. To control the direction and pace of that evolution, we must formulate fiscal, constrained system architectures that will support our force policy and strategy.
- o The criticality of the C³I system to effective operations is well recognized by potential adversaries; hence it is a lucrative target for enemy actions. To counter that threat, it is vital that key facilities and links be secure, resistant to physical, nuclear, chemical, and electronic attack, and readily reconstitutable to provide survivable and enduring operations.
- o The C³I system provides the capability required by commanders to orchestrate joint and combined operations; consequently, it is vital that we have adequate levels of interoperability.

C. C³I INITIATIVES

I perceive deficiencies in the ability of the existing C³I systems to satisfy these four required attributes. To resolve these problems, I have launched a sequence of organizational, architectural, and technical initiatives.

1. C³I-Weapons System Management

In an effort to improve the integration of the C³I system with the weapons systems that they support, I have made several organizational changes within USDRE. First, several staff members previously assigned to DUSD(C³I) have been attached to the directorates for Strategic and Theater Nuclear Forces, and Tactical Warfare Programs. These staff members will assist the respective deputies by ensuring that C³I concepts, systems and procedures are integrated with the design and acquisition of weapon systems, and will keep DUSD(C³I) informed of C³I requirements associated with programmed and planned weapon systems. Second, the position of Assistant Deputy Under Secretary of Defense for Systems Integration has been established within DUSD(C³I) to take a total systems perspective of the C³I-weapons systems. That office will oversee the formulation of fiscally constrained C³I-weapon system architectures, plan for evaluating the effectiveness of these architectures in the context of the missions that they are to support, and oversee the implementation of resulting investment strategies in the planning, programming, and budgeting system.

2. The Evolving C³I System Acquisition Strategy

We require improved architectural designs and acquisition strategies to insure that we develop, procure, and deploy essential,

survivable, and enduring systems, consistent with stringent fiscal constraints. To generate innovative ideas on efficiently and effectively acquiring the evolving C³I system, I am calling upon the skill and experience of industry and government executives. As one example, a study of the Electronic Warfare acquisition process, initiated by the previous administration, was recently completed by a special committee comprised of U.S. Government and key EW industry representatives. As a result of that study, I issued a memorandum that recommends: designing systems against approved projected threats; using concurrent development wherever practical to minimize program gaps; coordinating at an early stage among user, developer, and tester; providing logistical support concurrent with hardware delivery; and using acquisition approaches keyed to program characteristics. As a second example, I have accepted the offer of the Armed Forces Communications and Electronics Association (AFCEA) to perform an independent assessment of the application of evolutionary development approaches to C³I systems. A team of technical and management experts from private industry has been assembled to identify techniques to reduce acquisition cost and shorten acquisition time. A formal report documenting lessons learned and containing a set of recommendations is expected by mid 1982.

3. C³I System Resistance to Enemy Actions

In recognition of the threat to our C³I system that is posed by feasible enemy actions, I have placed renewed emphasis on insuring that appropriate portions of our C³I system can survive and endure under all conceivable levels of conflict. My primary initiative in this area has been in the area of strategic C³ where we have recently completed a

major Strategic Connectivity Review and are now developing a Nuclear Weapons Employment and Acquisition Master Plan jointly with the Under Secretary of Defense for Policy. However, I am committed to enhancing the survivability and endurance of the C³I system that supports all mission areas, and plan to reevaluate many ongoing programs where excessive emphasis on other factors (e.g., cost, security) have resulted in designs whose survivability is questionable.

4. interoperability

We have insufficient interoperability among key systems which support joint and combined operations. Representative of this problem is the limitation on interoperability among our communications systems and connected data processing systems. I am paying particular attention to several ongoing Service programs which are to provide secure, jam-resistant tactical communications to insure that we develop adequate interoperable modes.

In this area we are continuing and expanding the initiatives of prior administrations to enhance our capabilities for both multi-Service and multi-National operations. To establish a broad foundation for this activity, we have requested that the Defense Communications Agency develop a World-Wide Digital Systems Architecture and serve as executive agent for standard data communications protocols and defense-wide communications standards. In the tactical arena, we are carefully scrutinizing all Service programs in the area of secure, jam-resistant, line-of-sight communications (e.g., Joint Tactical Information Distribution System (JTIDS), Single Channel Ground-Airborne Radio System (SINCGARS-V), HAVE QUICK, SEEK TALK, AN/ARC-182) to ensure that

the composite program allows for inter-Service interoperability and provides the necessary technical attributes to defeat the threat at acceptable levels of risk and cost. We are also taking action to ensure that improvements to our high-frequency (HF) systems provide an interoperable, jam-resistant capability for beyond line-of-sight communications. In NATO, we recognize that greater interoperability with our NATO Allies will enable us to fight better as an Alliance. Consequently we are working closely with the appropriate NATO agencies (e.g., Allied Data Systems Interoperability Agency) to enhance our capabilities in this area.

D. SIGNIFICANT ACCOMPLISHMENTS

In each of the major areas that I have identified, we have realized accomplishments during the past year that significantly improve current operations and provide a sound basis for correcting many pervasive deficiencies.

1. Total C³I-Weapons System

We have made major strides in the past year in supplying the tactical commander and his subordinate weapon system operators with an expanded, more timely and complete view of the battlefield. One major milestone in this process occurred with the roll-out of the first of thirty-five TR-1 aircraft in June 1981. When these systems are fully fielded, with their appropriate sensor packages, they will provide a vital link in a target engagement system that will enable planned weapons systems to engage successfully second echelon enemy forces.

A second basic link in the engagement of enemy forces is the ability to identify targets accurately and reliably. To achieve that objective we are developing an interoperable, integrated identification system that provides C² (or indirect) support through the timely fusion and dissemination of identification information, and an improved autonomous capability. Progress towards achieving that objective was realized by the confirmation of draft NATO Standardization Agreement (STANAG) 4162 in June 1981. The next major milestone will be achieved shortly with the completion of a cost-effectiveness analysis which will establish the foundation for the U.S. development effort.

If the forces are to maneuver effectively and deliver ordnance with precision, it is critical that they have access to precise navigation and position fixing information and, on the integrated battlefield and in strategic conflicts, access to real-time detection and location of nuclear detonations (NUDETS). I anticipate a revolution in our capability to perform those functions with the fielding of the NAVSTAR Global Positioning System (GPS)/Integrated Operational NUDETS Detection System (IONDS) in the late 1980's. This past year we achieved an important milestone in this vital program when we successfully demonstrated the utility of manpack terminals to forces in Europe.

We recognize that the user has a unique perspective of the total C³I-Weapon system which should be reflected in near-term enhancements to the C² systems. To that end, a CINC initiatives program has been implemented to provide the eight unified and specified commanders with discretionary direct funding to carry out small scale, near-term C²

enhancements. In its first year, this process was successfully initiated with sixty-two individual projects undertaken at a cost of \$8.8 million.

2. The Evolving C³I System Acquisition Strategy

To provide a means for controlling the direction and pace of the evolving C³I system, we have completed several architectural and master plan initiatives, which we will update periodically, that encompass strategic, theater and tactical operations. In addition to our Strategic Modernization Package (see Chapter VII), these include:

- o Theater Nuclear Forces (TNF) C³ Improvement Plan.
A comprehensive TNF C³ improvement plan for Europe has been prepared and is undergoing final approval. The overall objective of the program is to increase C³ survivability in order to assure TNF effectiveness under the strategy of flexible response.
- o WWMCCS Information System (WIS) Modernization Plan.
We reported to Congress in January 1981 on our approach to replace the aging WWMCCS ADP and to provide an effective crisis management capability. We have designated the Air Force as the Joint Program Manager (JPM) for the WIS. The JPM will be the single management focal point for the entire modernization effort.
- o Satellite Communications (SATCOM) Architecture.
In April, a new architecture for SATCOM was approved to provide a consistent plan for the development and deployment of four major space segments and associated terminal equipment. This architecture defines the relationships and time phasing for the Military Strategic, Tactical and Relay (MILSTAR) system, the Defense Satellite Communications System (DSCS), the Fleet Satellite Communications (FLTSATCOM) system, and the Leased Satellite (LEASAT) system.
- o Service EW Master Plans. In response to an OSD request, the Services have issued EW Master Plans that identify key systems and deficiencies, provide capability assessments and describe concepts of operation. These plans are being synthesized into an OSD EW Master Plan to insure that the Service programs are mutually consistent and reinforcing.

- o Intelligence Plans. To support the evolution of tactical intelligence and related activities (TIARA) an approved DoD plan was published which contains a detailed examination of the tactical threat, baseline architectures, an R&D assessment, and objective architectures. In addition, actions have been initiated to define a Defense Military Intelligence Program ((DMIP) which parallels the existing General Defense Intelligence Program (GDIP).
- o European Theater Air C² Study (ETACCS). NATO has formulated a fifteen year blueprint to guide the evolution of the C³I-Weapon system mix for air operations. In parallel with this initiative we have undertaken ETACCS to track the C³I component of the NATO program and to provide U.S. inputs to clarify residual technical issues.

3. C³I System Resistance to Enemy Actions

During the past year we have embarked upon a number of programs that should make our C³I system more secure, jam-resistant, survivable, and enduring. In the area of security we have established a DoD Computer Security Evaluation Center at NSA as a center of excellence in computer security techniques to assist the development of DoD trusted computer systems and to evaluate the integrity of vendor products. In addition, we are promoting the introduction of moderately priced, high quality, narrow band secure voice in NATO by participating in the procurement of new secure voice equipment for a NATO wide testbed.

In the area of jam resistance, we are responding to the Service's urgent requirement to enhance tactical voice communication by procuring HAVE QUICK appliques. This should resolve near term deficiencies and give us time to design and procure an improved, interoperable

system for both voice and digital data that can cope with the perceived 1990's threat. In addition, we are procuring small, low cost, jam resistant SATCOM ground terminals which will be deployed at air bases in Europe where U.S. forces are stationed.

In the areas of survivability and endurance, we are pursuing multiple programs (e.g., Digital European Backbone (DEB), European Telephone System (ETS)) to enhance the basic communications infrastructure supporting our forces in Europe. More broadly, system engineering is underway in compliance with Presidential Directive 53 to implement the required long distance communications survivability program.

4. Interoperability.

Two significant milestones have been achieved during the past year which herald improvements in interoperability. The Joint Interoperability of Tactical Command and Control System (JINTACCS) program conducted its first operational effectiveness demonstration for joint Service intelligence systems in May 1981 in conjunction with the joint readiness exercise SOLID SHIELD 81. The Joint Tactical Communications Program (TRI-TAC) evidenced a noteworthy shift from a predominantly development oriented program to one with emphasis on production. This program promotes interoperability by permitting the Services to transition jointly from their current analog equipment to a modern digital communications system that provides voice, data, and facsimile service.

E. SUMMARY

I have launched several initiatives that should alter significantly the evolution of the C³I system. First, I have tried to instill

and promote the viewpoint that the C³I-weapon system must be treated as a totality. My intent is to procure a C³I system that is as survivable and enduring as the weapons systems it supports, and is capable of satisfying the requirements of those weapons systems over all feasible levels of conflict. Consistent with that perspective, I am managing the research, development, and acquisition of C³I-weapons system on a mission-oriented basis.

To accomplish this task effectively and efficiently, given our pressing fiscal constraints, I am promoting a planning process which views the evolving C³I-weapons system over a fifteen year time horizon. One essential element of that planning process is the formulation of fiscally constrained system architectures which can be applied to shape the direction and pace of that evolution. In order to identify preferred architectural options we are pursuing mission oriented evaluations of the total system. Once we have identified these preferred options, we will pursue innovative acquisition strategies to minimize the cost and time required to field these systems. With this approach, I am hopeful that we will be able to design, procure, and deploy an affordable, survivable, and enduring C³I system that will be capable of supporting its associated weapons systems under all conceivable levels of conflict.

XI. DEFENSE-WIDE MISSION SUPPORT

A. TEST AND EVALUATION (T&E)

1. Objectives

The Director, Defense Test and Evaluation evaluates weapons system acquisition and development risk by providing critical independent assessment of technical, functional, and life cycle characteristics from system conception through Initial Operational Capability (IOC). Developmental, operational, and joint tests and evaluations are supported by the major range and test facility base during the acquisition cycle. Specifically I will:

- a. Promote greater emphasis on early operationally oriented testing and on laboratory test correlation with operational conditions and profiles.
- b. Ensure procurement of adequate test hardware to support early maturation of reliability growth and proof of maintenance design.
- c. Promote resource allocations aimed at improvements in testing techniques and instrumentation, and early accumulation of test data to support the decision process.
- d. Ensure the effective utilization of system test beds, simulation techniques, and the evaluation of software performance in the assessment of system operational capability.

2. Major Systems

Test and Evaluation support of acquisition initiatives in FY 1983 will continue to emphasize early evaluation of performance

characteristics to generate timely information for program decisions. Additionally, I will encourage the timely submission and review of Test and Evaluation Master Plans (TEMPs), test reports, and constructive interaction of the Services' T&E agencies. These efforts will stress mission area and operational readiness through emphasis on reliability and maintainability. The comparison of measured results from operationally realistic tests with clearly defined requirements will be used to evaluate program progress, quantify risk and enhance early determination and correction of system shortfalls.

3. Joint Operational Test and Evaluation (JOT&E) Programs

The FY 1983 JOT&E program contains six tests to evaluate systems, tactics, concepts, and interoperability in multi-Service operational scenarios.

4. Test Facilities and Resource Accomplishments

The Strategic System Test Support Study (SSTSS) initiated last year to examine alternative fixed land and mobile air and sea instrumented platforms to support anticipated strategic offensive and defensive system test requirements, has been successfully concluded and will result in: Consolidation of test routes in the Pacific; restructuring and modernizing the mobile (ship and aircraft) resources; and upgrading terminal area instrumentation. These initiatives will ensure that timely test support will be available for MX and Trident II testing.

The first phase of construction for the tri-Service High Energy Laser (HEL) Systems Test Facility at White Sands Missile Range, will be completed by March 1983, adding a significant capability to our test resources.

Improvement and Modernization of the Major Range and Test Facility Base (MRTFB), is now demonstrating substantial pay-offs including improved simulator capabilities, enhanced range instrumentation systems, and a family of supersonic electro-optical airborne instrumentation pods.

5. Foreign Weapons Evaluation (FWE) Program

In FY 1983 we will continue to evaluate the potential of foreign weapon systems, munitions, equipment, and technology to meet United States armed forces requirements. This supports my objectives to avoid development costs and shorten the acquisition time to meet requirements by using off-the-shelf equipment where possible. My primary goal with this program is to increase readiness and sustainability through use of interoperable systems, equipment, and munitions. We have recently expanded the scope of this program to include equipment and technology evaluation. There are currently over fifty evaluations in process. To date, seven foreign systems have been adopted by DoD components as a result of the FWE program and I expect to see more in the near future as a result of our recent initiatives.

B. SPACE AND ORBITAL SUPPORT

1. Space Shuttle

The Shuttle with its new capabilities will play a vital role in our future military space operations. The DoD is a partner with NASA in the development and operation of the Space Transportation System (STS) and a major user. We are responsible for development of the Inertial Upper Stage (IUS), Vandenberg Air Force Base launch and landing facilities, and modifications to NASA facilities required to accommodate our unique operational requirements (predominately security). A DoD experiment will

fly on the fourth Shuttle test flight and we plan to begin the transition of operational spacecraft to Shuttle launch in October 1983.

In a joint NASA and Air Force review, we confirmed that the IUS is successfully meeting its performance specifications and we continue to support the program. To provide a hedge against near term schedule risk for the Titan/IUS, I am continuing plans for limited procurement of Transtage.

The Vandenberg program was extensively reviewed by the Air Force and NASA in July 1981. We were forced to delay the Initial Operational Capability from August 1984 to October 1985 to accommodate increasing schedule risk and technical considerations. Construction is well underway on all of the major facilities and equipment procurements are accelerating. The Shuttle Assembly Building and the Toxic Waste Disposal Facility are major new additions to the Vandenberg complex identified as necessary for early operations.

Security remains a problem with the Shuttle as we modify NASA facilities to allow classified operations. Preliminary results show increasing costs for securing the STS.

Projected STS operations costs are also increasing as actual cost data for early operations and the effects of lower-than-expected early flight rates are reflected in revised cost-per-flight reimbursement estimates by NASA.

On balance, I view the Shuttle program as one of great promise--but one with a significant effort yet remaining in the transition from a development program to a truly operational system.

2. Consolidated Space Operations Center (CSOC)

We have begun development of the CSOC which will enable us to decrease the vulnerability of space systems by eliminating single critical nodes for both satellite and Shuttle control. It will also provide the management and control needed for our military space operations in the post 1986 time frame.

C. NUCLEAR WEAPONS ACQUISITION SUPPORT

The Department of Defense and the Department of Energy (DoE) share statutory responsibilities for managing the U.S. nuclear weapons program. The President annually authorizes the number and types of nuclear weapons to be produced by DoE and transferred to DoD. He also annually approves a deployment plan for nuclear weapons, semi-annually authorizes the nuclear testing program, and as appropriate provides specific programmatic direction to DoD and DoE.

DoD is responsible for specifying desired weapon characteristics and for providing weapon delivery systems while the DoE designs and produces the nuclear warheads. Thus, decisions affecting either the system or the warhead design must consider the total impact on both Departments.

DoD and DoE are engaged in a major modernization program to support improvements in the second strike posture of our strategic nuclear forces and the replacement of many of our aging theater nuclear weapons with modern nuclear warheads having improved military effectiveness safety, security, survivability, and endurance in all environments.

Current programs in which both departments are involved include the development, production and deployment of modern nuclear systems (MX, the B-83 Strategic Bomb, ALCM, Trident, GLCM, PERSHING II, TOMAHAWK, SM-2, and 155mm artillery projectiles). Enhanced Radiation/Reduced Blast versions of Lance and 8 inch projectiles continue in production. Actions have been proposed that would eliminate the peaks and valleys which have characterized past DoE warhead production, and to improve the production, development, and exploratory research imbalance of recent years.

The total amount of special nuclear material (SNM) is a constraint which we cannot significantly alter in the short term. Supply and demand of these materials must be carefully monitored and, because of the long lead time involved, production decisions must be made in a timely manner. There is a valid need to develop sufficient reserves to insure that national security requirements are not constrained by the availability of SNM. The DoD supports those initiatives that will restore DoE capabilities to provide SNM reserves. Similarly, efforts to revitalize the DoE laboratory technology base and restore and increase the capacity of the DoE warhead production complex must continue to be adequately funded.

The President has announced his plans to dismantle the Department of Energy and place the nuclear weapons program along with Energy related research and development in a new organization, the Energy Research and Technology Administration, reporting to the Secretary of Commerce. The DoD is working to ensure that the nuclear weapon program objectives will be fulfilled by the new management arrangement.

D. GLOBAL MILITARY ENVIRONMENTAL SUPPORT

The forces of nature have often been the deciding factor in the outcome of a battle. Accurate knowledge of the atmospheric and ocean environment can give us this needed adverse weather capability which then acts as a critical force multiplier to significantly enhance the readiness of our deployed forces. Our environmental technology base provides the detailed knowledge needed for optimum weapon design, while our environmental observation and tactical decision aid development programs are focused towards providing the critical weapon and mission selection decisions needed to ensure the maximum total force effectiveness.

This year's environmental sciences programs for battle area support are integrated throughout to speed the transfer of the technology base developments into the operational force structure. The coordinated joint Service DoD Atmospheric Transmission Program provides the critically needed adverse weather capability for our forces.

Our Next Generation Weather Radar (NEXRAD) and Automated Weather Distribution System programs are two examples where we are transferring technology base developments into critical mission payoff areas. The new doppler capability of the NEXRAD radar will provide immediate enhancements in our ability to protect our valuable resources.

Probably the most critical wartime readiness element of our environment support structure is the Defense Meteorological Satellite Program (DMSP). In wartime, DMSP may be the only consistent source of weather data, thus

the JCS and Unified/Specified commanders have again stressed the readiness importance of the DMSP and reaffirmed its key place in our total force structure.

E. TRAINING SUPPORT

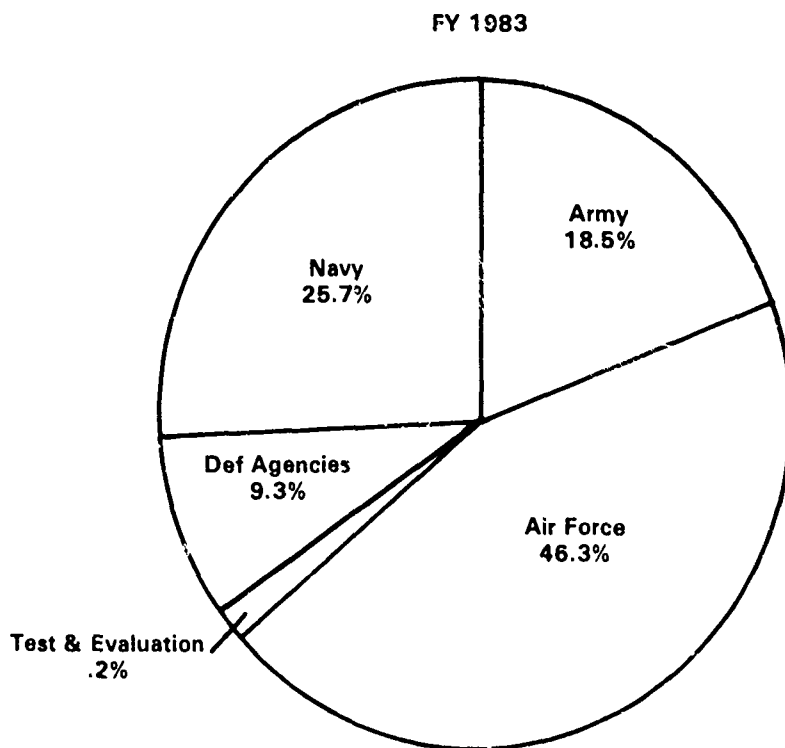
A fundamental problem we face in the next two decades will be to train skilled operators and maintenance personnel for the complex equipments we will be fielding. During the past years major industrial progress has been achieved with microprocessor technologies which can be adopted and modified to provide our military personnel with more effective forms of learning aids, personalized educational devices and training units that are portable enough for use in almost all environments. We will exploit the use of these devices to assist with maintenance procedures training, to provide more rapid and effective learning for those with reading deficiencies, and to extend the breadth of training from the simple procedural drills to the varied complex actions required during tactical exercises and operational employments.

APPENDIX A

- A- 2. RDT&E by Component
- A- 3. Procurement by Component
- A- 4. RDT&E/Procurement as Percent of DoD
- A- 5. RDT&E by Mission Category
- A- 6. RDT&E by R&D Category
- A- 7. RDT&E by Performer
- A- 8. RDT&E by Defense Programs
- A- 9. Procurement by Defense Programs
- A-10. Procurement by Appropriation

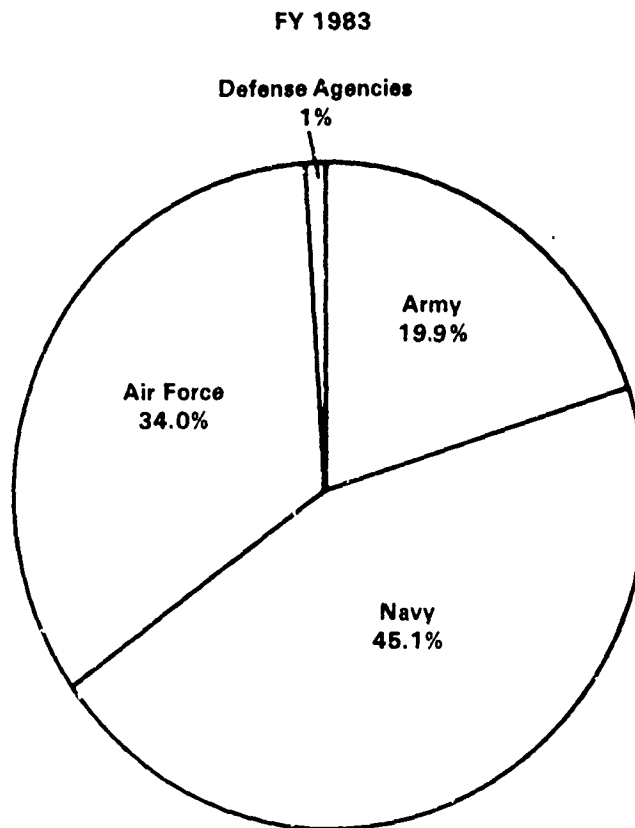
RDT&E BY COMPONENT (\$ MILLIONS)

	<u>FY 1981</u>	<u>%</u>	<u>FY 1982</u>	<u>%</u>	<u>FY 1983</u>	<u>%</u>	<u>FY 1984</u>	<u>%</u>
Army	3,124.3	18.8	3,609.5	18.0	4,484.0	18.5	5,284.7	19.3
Navy	5,024.9	30.2	5,807.1	29.0	6,232.3	25.7	7,746.5	28.2
Air Force	7,133.3	42.9	8,876.3	44.3	11,220.4	46.3	11,448.0	41.7
Defense Agencies	1,308.9	7.9	1,697.6	8.5	2,259.9	9.3	2,912.1	10.6
Defense Test & Evaluation	42.1	.2	53.0	.2	60.0	.2	63.7	.2
TOTAL RDT&E	16,633.5		20,043.6		24,256.6		27,455.1	



PROCUREMENT BY COMPONENT (\$ MILLIONS)

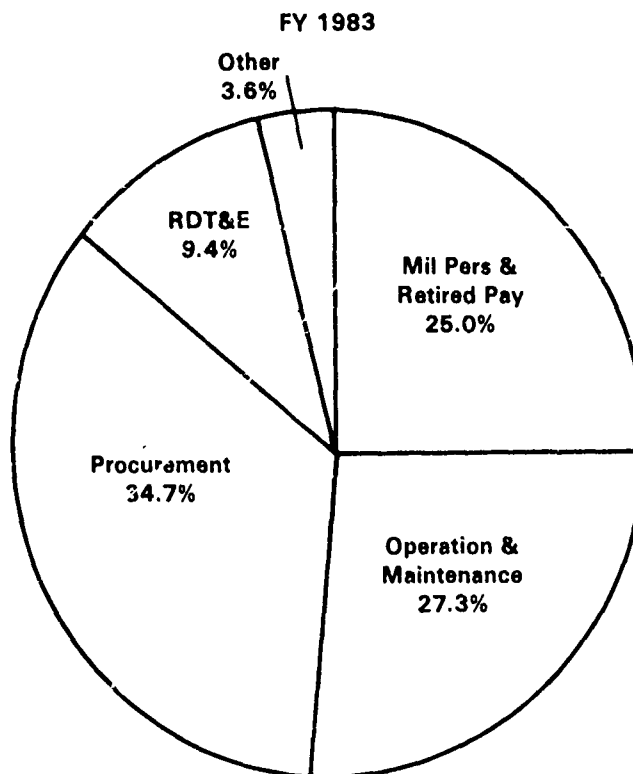
	<u>FY 1981</u>	<u>%</u>	<u>FY 1982</u>	<u>%</u>	<u>FY 1983</u>	<u>%</u>	<u>FY 1984</u>	<u>%</u>
Army	10,521.7	22.0	14,172.0	21.7	17,829.7	19.9	20,233.1	20.1
Navy	20,145.3	42.2	26,665.4	40.8	40,403.1	45.1	37,534.5	37.2
Air Force	16,779.0	35.1	24,002.8	36.7	30,429.8	34.0	42,048.2	41.7
Defense Agencies	321.5	.7	521.5	.8	890.3	1.0	1,010.1	1.0
TOTAL PROCUREMENT	47,767.5		65,361.7		89,552.8		100,825.9	



RDT&E/PROCUREMENT AS % OF DOD

(\$ MILLIONS)

	<u>FY 1981</u>	<u>%</u>	<u>FY 1982</u>	<u>%</u>	<u>FY 1983</u>	<u>%</u>	<u>FY 1984</u>	<u>%</u>
Mil Personnel	36,746	20.9	43,005	20.1	47,928	18.6	52,180	18.3
Retired Pay	13,724	7.8	15,036	7.0	16,511	6.4	17,732	6.2
Operat & Maint	55,245	31.4	62,990	29.4	70,434	27.3	75,166	26.3
Procurement	47,768	27.1	65,362	30.5	89,587	34.7	101,938	35.7
RDT&E	16,634	9.4	20,044	9.4	24,349	9.4	27,656	9.7
Mil Con	3,422	1.9	5,061	2.4	5,447	2.1	7,008	2.5
Family Housing	2,028	1.2	2,278	1.0	2,814	1.1	2,980	1.0
Spec Frgn Curncy	3		3		4		3	
Stock Funds	525	.3	456	.2	910	.4	795	.3
TOTAL	176,094		214,235		257,903		285,458	

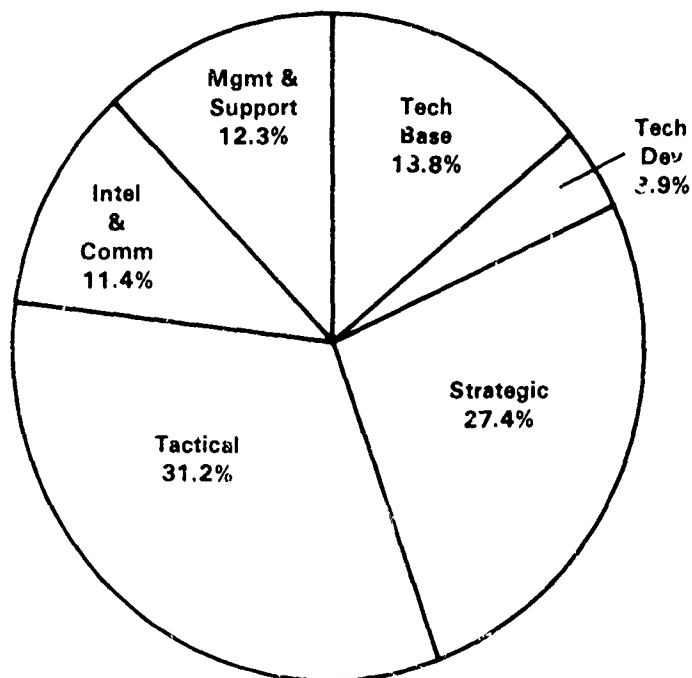


NOTE: RDT&E and Procurement amounts on this page will be higher than other tables due to their containing a spread of contingency funds.

RDT&E BY MISSION CATEGORY (\$ MILLIONS)

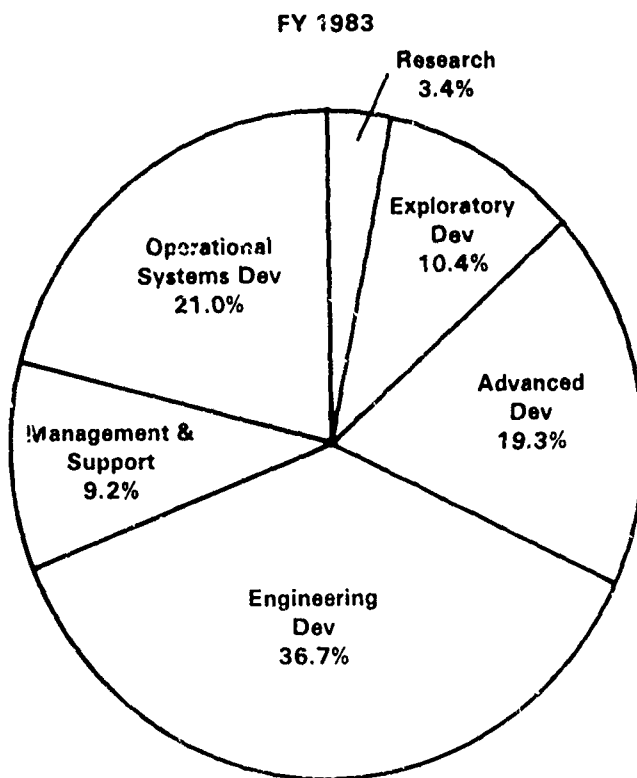
	<u>FY 1981</u>	<u>%</u>	<u>FY 1982</u>	<u>%</u>	<u>FY 1983</u>	<u>%</u>	<u>FY 1984</u>	<u>%</u>
Technology Base	2,600.1	15.6	2,907.1	14.5	3,336.9	13.8	3,807.6	13.9
Advanced Tech Dev	593.3	3.6	735.5	3.7	951.7	3.9	1,261.1	4.6
Strategic Prog	3,440.4	20.7	4,643.4	23.1	6,647.1	27.4	7,762.5	28.3
Tactical Prog	3,129.7	36.8	6,899.4	34.4	7,575.7	31.2	8,095.4	29.5
Defwide Intel & Communications	1,632.1	9.8	2,202.0	11.0	2,772.5	11.4	3,312.4	12.0
Defwide Mgmt & Support	2,237.9	13.5	2,655.9	13.3	2,972.6	12.3	3,216.2	11.7
TOTAL RDT&E	16,633.5		20,043.6		24,256.6		27,455.1	

FY 1983



RDT&E BY R&D CATEGORY (\$ MILLIONS)

	<u>FY 1981</u>	<u>%</u>	<u>FY 1982</u>	<u>%</u>	<u>FY 1983</u>	<u>%</u>	<u>FY 1984</u>	<u>%</u>
Research	614.8	3.7	694.6	3.5	828.1	3.4	927.8	3.4
Exploratory Dev	1,985.3	11.9	2,212.5	11.0	2,508.8	10.4	2,879.8	10.5
Advanced Dev	2,806.3	16.9	3,475.9	17.4	4,689.4	19.3	6,826.5	24.8
Engineering Dev	6,394.6	38.5	7,683.3	38.3	8,918.9	36.7	8,534.2	31.1
Mgmt & Support	1,735.9	10.4	2,008.9	10.0	2,223.8	9.2	2,409.4	8.8
Operational Systems Dev	3,096.7	18.6	3,968.4	19.8	5,087.6	21.0	5,877.3	21.4
TOTAL RDT&E	16,333.5		20,043.6		24,256.6		27,455.1	

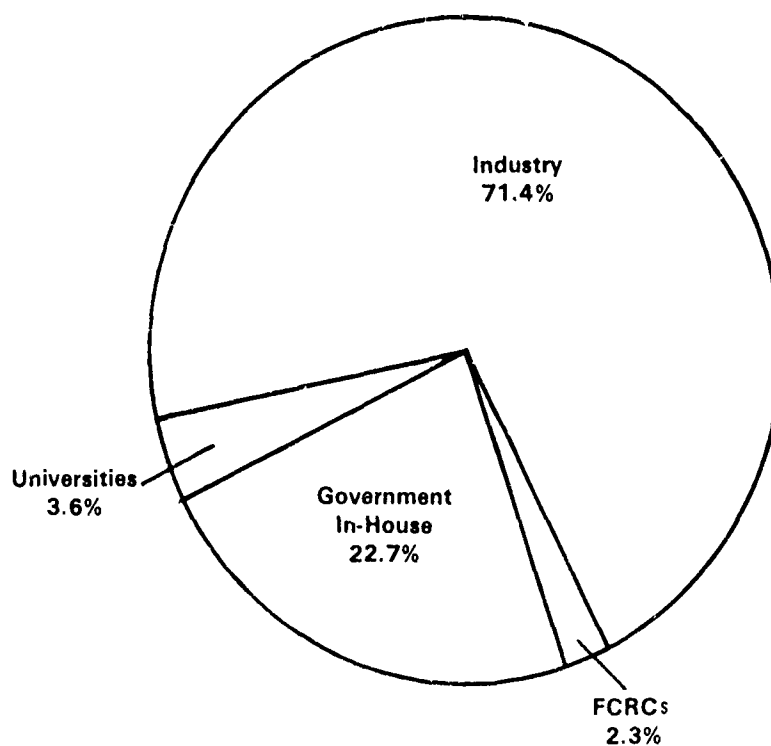


RDT&E BY PERFORMER

(\$ MILLIONS)

	<u>FY 1981</u>	<u>%</u>	<u>FY 1982</u>	<u>%</u>	<u>FY 1983</u>	<u>%</u>	<u>FY 1984</u>	<u>%</u>
Industry	11,193.5	67.3	13,877.2	69.2	17,316.2	71.4	19,748.8	71.9
Govt In-House	4,415.9	26.6	4,901.1	24.5	5,496.5	22.7	6,103.3	22.2
Federal Contract Res Ctrs (FCRCs)	405.0	2.4	484.5	2.4	564.7	2.3	621.3	2.3
Universities	619.1	3.7	780.8	3.9	880.2	3.6	981.7	3.6
TOTAL RDT&E	16,633.5		20,043.6		24,256.6		27,455.1	

FY 1983



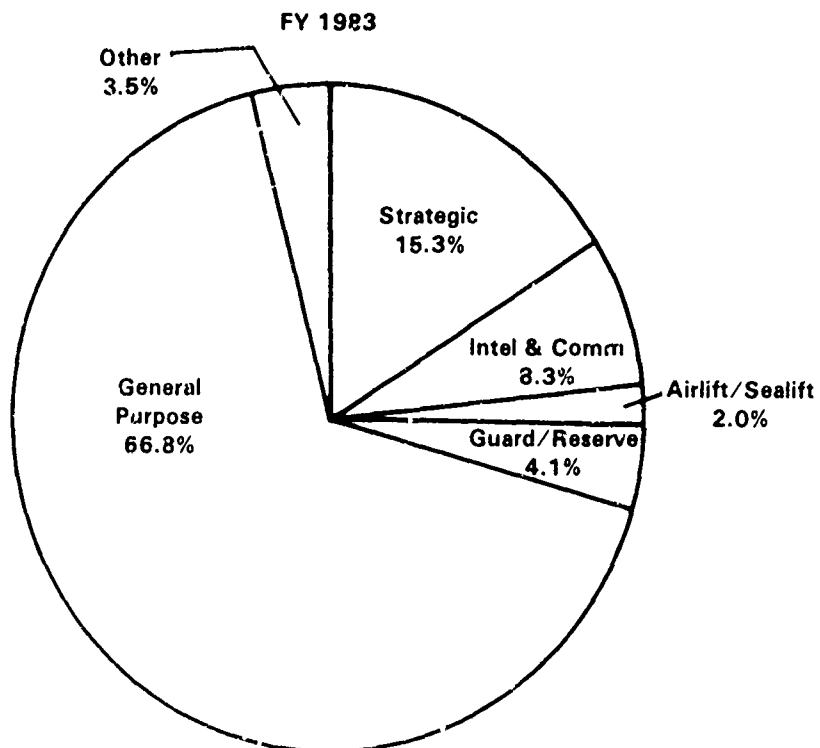
RDT&E BY DEFENSE PROGRAMS

(\$ MILLIONS)

	<u>FY 1981</u>	<u>%</u>	<u>FY 1982</u>	<u>%</u>	<u>FY 1983</u>	<u>%</u>	<u>FY 1984</u>	<u>%</u>
Strategic Forces	682.7	4.1	713.2	3.6	803.8	3.5	882.1	3.2
Gen Purp Forces	712.9	4.3	848.1	4.3	1,250.1	5.1	1,386.9	5.1
Intel & Communs	1,660.9	10.0	2,362.0	11.8	2,963.3	12.2	3,579.5	13.0
Airlift/Sealift	26.9	.2	30.5	.1	12.6	.1	7.3	
Res & Dev (Prog 6)	13,536.9	81.4	16,075.3	80.2	19,169.0	79.0	21,577.7	78.6
Cntrl Sply & Maint	10.3		11.0		13.7	.1	17.4	.1
Trng, Medical, Other	.6		1.0		1.2		1.4	
Spt of Other Nations	2.3		2.6		2.8		2.8	
TOTAL RDT&E	<u>16,333.5</u>		<u>20,043.6</u>		<u>24,256.6</u>		<u>27,455.1</u>	

PROCUREMENT BY DEFENSE PROGRAMS (\$ MILLIONS)

	<u>FY 1981</u>	<u>%</u>	<u>FY 1982</u>	<u>%</u>	<u>FY 1983</u>	<u>%</u>	<u>FY 1984</u>	<u>%</u>
Strategic Forces	5,174.7	10.8	7,353.0	11.3	13,734.7	15.3	19,340.6	19.2
Gen Purp Forces	33,487.1	70.1	46,556.5	71.2	59,782.3	66.8	62,017.4	61.6
Intel & Communs	3,936.5	8.3	4,988.7	7.6	7,399.2	8.3	8,281.6	8.2
Airlift/Sealift	864.3	1.8	1,621.5	2.5	1,789.7	2.0	3,630.3	3.6
Guard & Reserve Forces	1,948.9	4.1	2,229.9	3.4	3,664.0	4.1	4,170.9	4.1
Central Supply & Maintenance	1,255.5	2.6	1,266.6	1.9	1,781.5	2.0	1,891.9	1.9
Training, Medical	625.4	1.3	838.0	1.3	923.1	1.0	1,107.7	1.0
Administrative & Assoc Activs	93.1	0.2	163.2	0.3	292.2	0.3	276.7	0.3
Support to Other Nations	382.0	0.8	344.3	0.5	186.1	0.2	108.8	0.1
TOTAL PROCUREMENT	47,767.5		65,361.7		89,552.8		100,826.9	



PROCUREMENT BY APPROPRIATION

(\$ MILLIONS)

	<u>FY 1981</u>	<u>FY 1982</u>	<u>FY 1983</u>	<u>FY 1984</u>
Aircraft Procurement, Army	1,202.6	1,936.1	2,745.9	3,373.1
Aircraft Procurement, Navy	6,254.3	9,140.0	11,582.3	12,899.7
Aircraft Procurement, Air Force	10,297.6	14,021.9	17,756.7	24,036.5
TOTAL AIRCRAFT PROC	17,754.5	25,098.0	32,084.9	40,309.3
Missile Procurement, Army	1,544.9	2,155.2	2,846.6	3,333.9
Weapons (Missile) Proc, Navy	2,217.0	2,545.7	3,128.9	3,871.6
Missile Procurement Air Force	3,333.3	4,574.0	6,827.9	9,689.5
TOTAL MISSILE PROC	7,095.2	9,274.9	12,803.4	16,895.0
Weapons & Tracked Combat Vehicles, Army	3,374.2	4,002.3	5,030.7	5,702.6
Amunition, Army	1,558.7	2,302.5	2,639.0	3,024.1
Weapons (Non-Missile) Procurement, Navy	521.2	669.4	772.7	1,060.7
Shipbldg & Conversion, Navy	7,617.0	8,902.3	18,648.3	12,455.7
Other Procurement, Army	2,841.3	3,775.9	4,567.5	4,799.4
Other Procurement, Navy	3,029.9	3,676.6	3,970.2	5,259.2
Other Procurement, Air Force	3,140.1	5,406.4	5,845.2	8,322.2
TOTAL OTHER PROC	22,090.4	28,735.4	41,473.6	40,623.9
Procurement, Marine Corps	506.0	1,731.5	2,300.7	1,987.6
Procurement, Def Agencies	321.5	521.5	890.3	1,010.1
TOTAL PROCUREMENT	47,767.5	65,361.7	89,552.8	100,825.9

APPENDIX B

ACRONYMS

ABM - Anti-ballistic Missile
ADCoP - Acquisition and Distribution of Commercial Products
ADM - Atomic Demolition Munition
AEW - Airborne Early Warning
AFAP - Artillery Fired Atomic Projectiles
ALCM - Air Launched Cruise Missile
ARM - Anti-Radiation Missile
ASARS - Advanced Synthetic Aperture Radar System
ASD - Assistant Secretary of Defense
ASW - Anti-Submarine Warfare
ATB - Advanced Technology Bomber
ATSD(AE) - Assistant to Secretary of Defense (Atomic Energy)
AUTODIN - Automatic Digital Network
AWACS - Airborne Warning and Control System

BMD - Ballistic Missile Defense
BM&R - Backlog of Maintenance and Repair

CAIG - Cost Analysis Improvement Group
CBR - Chemical, Biological and Radiological
CNAD - Conference of National Armaments Directors
COCOM - Coordinating Committee
COMINT - Communications Intelligence
CSOC - Consolidated Space Operations Center
C³I - Command, Control, Communications, and Intelligence
C³CM - Command, Control and Communications Countermeasures

DAR - Defense Acquisition Regulation
DARPA - Defense Advanced Research Projects Agency
DEB - Digital European Backbone
DMIP - Defense Military Intelligence Program
DMSP - Defense Meteorological Satellite Program
DNA - Defense Nuclear Agency
DoE - Department of Energy
DPAC - Defense Policy Advisory Committee
DRB - Defense Resources Board
DSARC - Defense System Acquisition Review Council
DSCS - Defense Satellite Communications System

EPA - Extended Planning Annex
ER/RB - Enhanced Radiation/Reduced Blast
ETACCS - European Theater Air Command & Control
ETS - European Telephone System
EW - Electronic Warfare

FLIR - Forward Looking Infrared
FLTSATCOM - Fleet Satellite Communications

FMIS - Financial Management Information System
FWE - Foreign Weapons Evaluation
FYDP - Five Year Defense Plan

GDIP - General Defense Intelligence Program
GLCM - Ground Launched Cruise Missile
GNP - Gross National Product
GPS - Global Positioning System

HARM - High Speed Anti-Radiation Missile
HEL - High Energy Laser
HF - High Frequency

ICBM - Intercontinental Ballistic Missile
IEPG - Independent European Program Group
I&M - Improvement and Modernization
INF - Intermediate Range Nuclear Forces
IOC - Initial Operational Capability
IP - Industrial Preparedness
IR&D - Independent Research & Development
IONDS - Integrated Operational NUDETS Detection System
ITS - Integrated Tactical Surveillance System
IUS - Inertial Upper Stage
IUSS - Integrated Undersea Surveillance System
IVA - Intermediate Volatility Agent

JINTACCS - Joint Interoperability of Tactical Command and Control System
JOT&E - Joint Operational Test and Evaluation
JPM - Joint Program Manager
JTIDS - Joint Tactical Information Distribution System

LCAC - Landing Craft Air Cushion
LEASAT - Leased Satellite
LTDP - Long-Term Defense Program

MCTL - Militarily Critical Technologies List
MILSTAR - Military Strategic, Tactical and Relay
NOA - Memorandum of Agreement
MPA - Maritime Patrol Aircraft
MPT - Manpower, Personnel and Training
MRASM - Medium Range Air-to-Surface Missile
MRTFB - Major Range and Test Facility Base
MX - Missile Experimental

NASA - National Aeronautics and Space Administration
NCA - National Command Authorities
NEXRAD - Next Generation Weather Radar
NUDETS - Nuclear Detonations

OTH - Over the Horizon
OTH-B - Over-the-horizon Backscatter
OSD - Office of the Secretary of Defense
OED - Operational Evaluation Demonstration

PAPS - Periodic Armaments Planning System
P³I - Preplanned Product Improvements
PLSS - Precision Location Strike System
POM - Program Objectives Memorandum
PPBS - Planning Programming Budgeting System
PRC - Peoples Republic of China

RDA - Research, Development, and Acquisition
RDT&E - Research, Development, Test and Evaluation

SALT - Strategic Arms Limitation Talks
SAR - Selected Acquisition Reports
SATCOM - Satellite Communications
SDS - Satellite Data System
SINCGARS - Single Channel Ground Airborne Radio Systems
SLBM - Submarine Launched Ballistic Missile
SLCM - Sea Launched Cruise Missile
SNM - Special Nuclear Material
SSB/SSBN - Ballistic Missile Submarine/Nuclear Ballistic Missile Submarine
SSN - Attack Submarine
SSTSS - Strategic System Test Support Study
STS - Space Transportation System
S&T - Science & Technology
START - Strategic Arms Reduction Talks
STANAG - Standardization Agreement

TASM - Tomahawk Anti-Ship Missile
T&E - Test and Evaluation
TEMPS - Test and Evaluation Master Plans
TIARA - Tactical Intelligence and Related Activities
TLAM - Sea Launched Land Attack Cruise Missile
TNF - Theater Nuclear Forces
TNW - Theater Nuclear Warfare
TOA - Total Obligational Authority
TRI-TAC - Joint Tactical Communications Program
TWP - Tactical Warfare Programs

USUHS - Uniform Services University of Health Sciences
USDRE - Under Secretary of Defense for Research and Engineering

VHSIC - Very High Speed Integrated Circuits
VLS - Vertical Launch System

WWMCCS - World Wide Military Command and Control System
WIS - WWMCCS Information System